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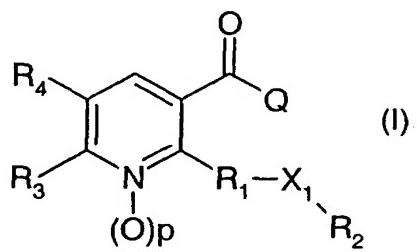
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(54) Title: SUBSTITUTED PYRIDINE HERBICIDES

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(57) Abstract: Compounds of the formula (I) in which the substituents are as defined in claim 1 are suitable for use as herbicides.



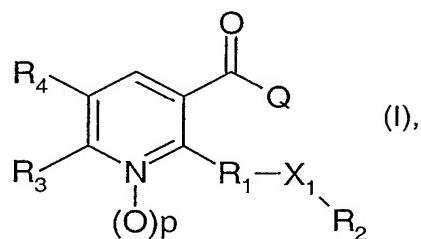
SUBSTITUTED PYRIDINE HERBICIDES

The present invention relates to novel herbicidally active pyridine ketones, to processes for their preparation, to compositions which comprise these compounds, and to their use for controlling weeds, in particular in crops of useful plants, or for inhibiting plant growth.

Pyridine ketones having herbicidal action are described, for example, in WO 00/15615 and WO/0039094.

We have now found novel pyridine ketones having herbicidal and growth-inhibiting properties.

The present invention thus provides compounds of the formula I



in which

p is 0 or 1;

R_1 is a $\text{C}_1\text{-}\text{C}_6$ alkylene, $\text{C}_3\text{-}\text{C}_6$ alkenylene or $\text{C}_3\text{-}\text{C}_6$ alkynylene chain which may be mono- or polysubstituted by halogen or R_5 , where the unsaturated bonds of the chain are not attached directly to the substituent X_1 ;

X_1 is oxygen, $-\text{O}(\text{CO})-$, $-(\text{CO})\text{O}-$, $-\text{O}(\text{CO})\text{O}-$, $-\text{N}(\text{R}_6)\text{O}-$, $-\text{O}-\text{NR}_{51}-$, thio, sulfinyl, sulfonyl, $-\text{SO}_2\text{NR}_7-$, $-\text{NR}_{52}\text{SO}_2-$ or $-\text{NR}_8-$;

R_2 is a $\text{C}_1\text{-}\text{C}_6$ alkyl, $\text{C}_3\text{-}\text{C}_6$ alkenyl or $\text{C}_3\text{-}\text{C}_6$ alkynyl group which is mono- or polysubstituted by halogen, hydroxyl, amino, formyl, nitro, cyano, mercapto, carbamoyl, $\text{C}_1\text{-}\text{C}_6$ alkoxy, $\text{C}_1\text{-}\text{C}_6$ alkoxycarbonyl, $\text{C}_2\text{-}\text{C}_6$ alkenyl, $\text{C}_2\text{-}\text{C}_6$ haloalkenyl, $\text{C}_2\text{-}\text{C}_6$ alkynyl, $\text{C}_2\text{-}\text{C}_6$ haloalkynyl, $\text{C}_3\text{-}\text{C}_6$ cycloalkyl, by halogen-substituted $\text{C}_3\text{-}\text{C}_6$ cycloalkyl, or by $\text{C}_3\text{-}\text{C}_6$ alkenyloxy, $\text{C}_3\text{-}\text{C}_6$ alkynyloxy, $\text{C}_1\text{-}\text{C}_6$ haloalkoxy, $\text{C}_3\text{-}\text{C}_6$ haloalkenyloxy, cyano- $\text{C}_1\text{-}\text{C}_6$ alkoxy, $\text{C}_1\text{-}\text{C}_6$ alkoxy- $\text{C}_1\text{-}\text{C}_6$ alkoxy, $\text{C}_1\text{-}\text{C}_6$ alkoxy- $\text{C}_1\text{-}\text{C}_6$ alkoxy- $\text{C}_1\text{-}\text{C}_6$ alkoxy, $\text{C}_1\text{-}\text{C}_6$ alkylthio- $\text{C}_1\text{-}\text{C}_6$ alkoxy, $\text{C}_1\text{-}\text{C}_6$ alkyl-sulfinyl- $\text{C}_1\text{-}\text{C}_6$ alkoxy, $\text{C}_1\text{-}\text{C}_6$ alkylsulfonyl- $\text{C}_1\text{-}\text{C}_6$ alkoxy, $\text{C}_1\text{-}\text{C}_6$ alkoxycarbonyl- $\text{C}_1\text{-}\text{C}_6$ alkoxy,

C₁-C₆alkoxycarbonyl, C₁-C₆alkylcarbonyl, C₁-C₆alkylthio, C₁-C₆alkylsulfinyl, C₁-C₆alkylsulfonyl, C₁-C₆haloalkylthio, C₁-C₆haloalkylsulfinyl, C₁-C₆haloalkylsulfonyl, oxiranyl, which for its part may be substituted by C₁-C₆alkyl, or by (3-oxetanyl)oxy, which for its part may be substituted by C₁-C₆alkyl, or by benzylthio, benzylsulfinyl, benzylsulfonyl, C₁-C₆alkylamino, di(C₁-C₆alkyl)amino, R₉S(O)₂O, R₁₀N(R₁₁)SO₂⁻, thiocyanato, phenyl, phenoxy, phenylthio, phenylsulfinyl or phenylsulfonyl; where the phenyl- or benzyl-containing groups for their part may be substituted by one or more C₁-C₆alkyl, C₁-C₆haloalkyl, C₁-C₆alkoxy, C₁-C₆haloalkoxy, halogen, cyano, hydroxyl or nitro groups, or

R₂ is phenyl which may be mono- or polysubstituted by C₁-C₆alkyl, C₁-C₆haloalkyl, C₁-C₆alkoxy, C₁-C₆haloalkoxy, halogen, cyano, hydroxyl or nitro; or

R₂ is C₃-C₆cycloalkyl, C₁-C₆alkoxy- or C₁-C₆alkyl-substituted C₃-C₆cycloalkyl, 3-oxetanyl or C₁-C₆alkyl-substituted 3-oxetanyl;

or, if Q is Q₂ or Q₃, or is Q₁ in which R₁₄ and R₂₂ are a C₂-C₃alkylene chain, R₂ is additionally also a five- to ten-membered monocyclic or fused bicyclic ring system which may be aromatic, saturated or partially saturated and may contain 1 to 4 heteroatoms selected from the group consisting of nitrogen, oxygen and sulfur, where the ring system is attached directly or via a C₁-C₄alkylene, C₂-C₄alkenyl-C₁-C₄alkylene, C₂-C₄alkynyl-C₁-C₄alkylene, -N(R₁₂)-C₁-C₄alkylene, -SO-C₁-C₄alkylene or -SO₂-C₁-C₄alkylene group to the substituent X₁ and where each ring system may not contain more than two oxygen atoms and not more than two sulfur atoms and the ring system for its part may be mono-, di- or trisubstituted by C₁-C₆alkyl, C₁-C₆haloalkyl, C₂-C₆alkenyl, C₂-C₆haloalkenyl, C₂-C₆alkynyl, C₂-C₆haloalkynyl, C₁-C₆alkoxy, hydroxyl, C₁-C₆haloalkoxy, C₃-C₆alkenyloxy, C₃-C₆alkynyoxy, mercapto, C₁-C₆alkylthio, C₁-C₆haloalkylthio, C₃-C₆alkenylthio, C₃-C₆haloalkenylthio, C₃-C₆alkynylthio, C₂-C₅alkoxyalkylthio, C₃-C₅acetylalkylthio, C₃-C₆alkoxycarbonylalkylthio, C₂-C₄cyanoalkylthio, C₁-C₆alkylsulfinyl, C₁-C₆haloalkylsulfinyl, C₁-C₆alkylsulfonyl, C₁-C₆haloalkylsulfonyl, aminosulfonyl, C₁-C₂alkylaminosulfonyl, di(C₁-C₂alkyl)aminosulfonyl, di(C₁-C₄alkyl)amino, halogen, cyano, nitro, phenyl and benzylthio, where phenyl and benzylthio for their part may be substituted on the phenyl ring by C₁-C₃alkyl, C₁-C₃haloalkyl, C₁-C₃alkoxy, C₁-C₃haloalkoxy, halogen, cyano or nitro, and where the substituents on the nitrogen in the heterocyclic ring are different from halogen; or

R₂ is hydrogen or unsubstituted C₁-C₈alkyl if

a) R₁ is substituted by the group R₅, or

b) Q is the group Q₂, or

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- c) Q is the group Q_3 in which X_1 is $-\text{O}(\text{CO})-$, $-(\text{CO})\text{O}-$, $-\text{N}(\text{R}_6)\text{O}-$, $-\text{O}-\text{NR}_{51}-$, $-\text{SO}_2\text{NR}_7-$, $-\text{NR}_{52}\text{SO}_2-$ or $-\text{NR}_8-$; or
- d) Q is the group Q_1 in which X_1 is $-\text{N}(\text{R}_6)\text{O}-$, $-\text{O}-\text{NR}_{51}-$, $-\text{SO}_2\text{NR}_7-$, $-\text{NR}_{52}\text{SO}_2-$ or $-\text{NR}_8-$, or
- e) Q is the group Q_1 in which R_{14} and R_{22} in Q_1 are a $C_2\text{-}C_3$ alkylene chain and X_1 is $-\text{O}(\text{CO})-$ or $-(\text{CO})\text{O}-$,

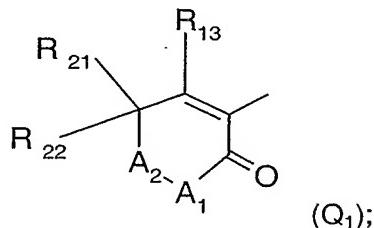
R_3 is $\text{C}_1\text{-}\text{C}_3$ haloalkyl;

R_4 is hydrogen, halogen, $\text{C}_1\text{-}\text{C}_3$ alkyl, $\text{C}_1\text{-}\text{C}_3$ haloalkyl, $\text{C}_1\text{-}\text{C}_3$ alkoxy, $\text{C}_1\text{-}\text{C}_3$ alkoxy-C₁-C₃alkyl or $\text{C}_1\text{-}\text{C}_3$ alkoxy-C₁-C₃alkoxy;

R_5 is hydroxyl, $\text{C}_1\text{-}\text{C}_6$ alkoxy, $\text{C}_3\text{-}\text{C}_6$ cycloalkyloxy, $\text{C}_1\text{-}\text{C}_6$ alkoxy-C₁-C₆alkoxy, $\text{C}_1\text{-}\text{C}_6$ alkoxy-C₁-C₆alkoxy-C₁-C₆alkoxy or $\text{C}_1\text{-}\text{C}_2$ alkylsulfonyloxy;

R_6 , R_7 , R_8 , R_9 , R_{10} , R_{11} , R_{12} , R_{51} and R_{52} independently of one another are hydrogen, $\text{C}_1\text{-}\text{C}_6$ alkyl, $\text{C}_1\text{-}\text{C}_6$ haloalkyl, $\text{C}_1\text{-}\text{C}_6$ alkoxycarbonyl, $\text{C}_1\text{-}\text{C}_6$ alkylcarbonyl, $\text{C}_1\text{-}\text{C}_6$ alkoxy-C₁-C₆alkyl, $\text{C}_1\text{-}\text{C}_6$ alkoxy-C₁-C₆alkyl substituted by $\text{C}_1\text{-}\text{C}_6$ alkoxy, benzyl or phenyl, where phenyl and benzyl for their part may be mono- or polysubstituted by $\text{C}_1\text{-}\text{C}_6$ alkyl, $\text{C}_1\text{-}\text{C}_6$ haloalkyl, $\text{C}_1\text{-}\text{C}_6$ alkoxy, $\text{C}_1\text{-}\text{C}_6$ haloalkoxy, halogen, cyano, hydroxyl or nitro; where R_6 and R_9 are not simultaneously hydrogen and hydrogen, $\text{C}_1\text{-}\text{C}_6$ alkoxycarbonyl or $\text{C}_1\text{-}\text{C}_6$ alkylcarbonyl, respectively;

Q is Q_1



in which

A_1 is $\text{C}(\text{R}_{14}\text{R}_{15})$, NR_{16} or oxygen;

A_2 is $\text{C}(\text{R}_{17}\text{R}_{18})$, $\text{C}(\text{O})$, $-\text{C}=\text{N}-\text{O}-\text{R}_{19}$, oxygen, thio, sulfinyl, sulfonyl, $-\text{NR}_{20}$ or ethylene; with the provisos that A_1 is different from oxygen if A_2 is oxygen, $\text{C}(\text{O})$, thio, sulfinyl, $-\text{C}=\text{N}-\text{O}-\text{R}_{19}$, NR_{20} or $\text{C}(\text{R}_{17}\text{R}_{18})$, where R_{17} and R_{18} independently of one another are $\text{C}_1\text{-}\text{C}_4$ alkoxy, $\text{C}_1\text{-}\text{C}_4$ alkylthio, $\text{C}_1\text{-}\text{C}_4$ alkylsulfinyl, $\text{C}_1\text{-}\text{C}_4$ alkylsulfonyl; and A_1 is different from NR_{16} if A_2 is thio, sulfinyl or $\text{C}(\text{R}_{17}\text{R}_{18})$, where R_{17} and R_{18} independently of one another are $\text{C}_1\text{-}\text{C}_4$ alkoxy, $\text{C}_1\text{-}\text{C}_4$ alkylthio, $\text{C}_1\text{-}\text{C}_4$ alkylsulfinyl, $\text{C}_1\text{-}\text{C}_4$ alkylsulfonyl; R_{14} and R_{22} independently of one another are hydrogen, $\text{C}_1\text{-}\text{C}_4$ alkyl, $\text{C}_1\text{-}\text{C}_4$ haloalkyl, $\text{C}_3\text{-}\text{C}_4$ alkenyl, $\text{C}_3\text{-}\text{C}_4$ alkynyl, $\text{C}_1\text{-}\text{C}_4$ alkylthio,

C₁-C₄alkylsulfinyl, C₁-C₄alkylsulfonyl, C₁-C₄alkylsulfonyloxy, C₁-C₄alkoxy, C₁-C₄alkoxycarbonyl or C₁-C₄alkylcarbonyl;

R₁₅ and R₂₁ independently of one another are hydrogen, C₁-C₄alkyl, C₁-C₄haloalkyl, C₃-C₄alkenyl or C₃-C₄alkynyl;

R₁₇ is hydrogen, C₁-C₄alkyl, C₁-C₄haloalkyl, C₁-C₄alkoxy, C₁-C₄alkylthio, C₁-C₄alkylsulfinyl or C₁-C₄alkylsulfonyl;

R₁₈ is hydrogen, C₁-C₄alkyl, C₁-C₄haloalkyl, C₃-C₄alkenyl, C₃-C₄alkynyl, C₁-C₄alkoxy, C₁-C₄alkylthio, C₁-C₄alkylsulfinyl, C₁-C₄alkylsulfonyl or C₁-C₄dialkoxyalkyl-C₁-C₄alkyl;

R₂₀ is C₁-C₄alkyl, C₃-C₆cycloalkyl, C₃-C₄alkenyl, C₃-C₄alkynyl, C₁-C₄alkylcarbonyl, C₁-C₄alkylcarbonyloxy, di(C₁-C₄alkyl)aminocarbonyl or benzyl, where the phenyl group may be mono- or polysubstituted by C₁-C₆alkyl, C₁-C₆haloalkyl, C₁-C₆alkoxy, C₁-C₆haloalkoxy, halogen, cyano, hydroxyl or nitro;

R₁₉ and R₁₆ independently of one another are hydrogen, C₁-C₄alkyl, C₃-C₆cycloalkyl, C₃-C₄alkenyl, C₃-C₄alkynyl, benzyl or phenyl, where phenyl and benzyl for their part may be mono- or polysubstituted by C₁-C₆alkyl, C₁-C₆haloalkyl, C₁-C₆alkoxy, C₁-C₆haloalkoxy, halogen, cyano, hydroxyl or nitro;

or R₁₄ and R₂₂ together form a C₂-C₃alkylene chain;

or R₁₄ and R₁₅ together and/or R₁₇ and R₁₈ together and/or R₂₁ and R₂₂ together form a C₂-C₄alkylene chain which may be interrupted by oxygen and/or carbonyl and/or sulfur, with the proviso that the oxygen and sulfur atoms are separated by at least one methylene group;

or R₁₄ and R₁₈ together form a C₂-C₄alkylene chain; or

R₂₂ and R₁₈ together form a C₂-C₄alkylene chain;

or R₁₈ together with R₂₂ or R₁₄ forms a direct bond;

or R₁₆ and R₁₈ together form a C₂-C₄alkylene chain;

R₁₃ is hydroxyl, O⁻M⁺, where M⁺ is an alkali metal cation or ammonium cation, halogen, C₁-C₁₂alkylsulfonyloxy, amino, C₁-C₄alkylthio, C₁-C₁₂alkylsulfinyl, C₁-C₁₂alkylsulfonyl, C₁-C₁₂haloalkylthio, C₁-C₁₂haloalkylsulfinyl, C₁-C₁₂haloalkylsulfonyl, C₁-C₆alkoxy-C₁-C₆alkylsulfinyl, C₁-C₆alkoxy-C₁-C₆alkylsulfonyl, C₃-C₁₂alkenylthio, C₃-C₁₂alkenylsulfinyl, C₃-C₁₂alkenylsulfonyl, C₃-C₁₂alkynylthio, C₃-C₁₂alkynylsulfinyl, C₃-C₁₂alkynylsulfonyl, C₁-C₄alkoxycarbonyl-C₁-C₄alkylthio, C₁-C₄alkoxycarbonyl-C₁-C₄alkylsulfinyl, C₁-C₄alkoxycarbonyl-C₁-C₄alkylsulfonyl, (C₁-C₄alkoxy)₂P(O)O, C₁-C₄alkyl-(C₁-C₄alkoxy)P(O)O, H(C₁-C₄alkoxy)P(O)O, R₂₃R₂₄N, R₂₅R₂₆NNH, R₂₇R₂₈NC(O)O-, R₂₉R₃₀NC(O)NH-, C₁-C₁₈alkylcarbonyloxy, C₂-C₁₈alkenylcarbonyloxy, C₂-C₁₈alkynylcarbonyloxy, C₃-C₆cycloalkylcarbonyloxy, C₁-C₁₂alkoxycarbonyloxy, C₁-C₁₂alkylthio-

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carbonyloxy, C₁-C₁₂alkylthiocarbamoyl, where the alkyl, alkenyl and alkynyl groups may be substituted by halogen, C₁-C₆alkoxy, C₁-C₆alkylthio, C₁-C₆alkylsulfinyl, C₁-C₆alkylsulfonyl or cyano;

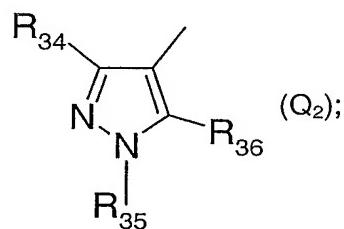
or R₁₃ is phenoxy, phenylthio, phenylsulfinyl, phenylsulfonyl, phenylsulfonylamino, phenylsulfonyloxy or benzoxyloxy, where the phenyl groups for their part may be substituted by one or more halogen, nitro, cyano, C₁-C₄alkyl, C₁-C₄haloalkyl, C₁-C₄alkoxy or C₁-C₄haloalkoxy groups;

or R₁₃ is a group Het₁-thio, Het₂-sulfinyl, Het₃-sulfonyl, Het₄-(CO)O or Het₅-N(R₃₃); in which Het₁, Het₂, Het₃, Het₄ and Het₅ independently of one another are a five- to ten-membered monocyclic or fused bicyclic ring system which may be aromatic or partially saturated and may contain 1 to 4 heteroatoms selected from the group consisting of nitrogen, oxygen and sulfur, and where each ring system may not contain more than 2 oxygen atoms and not more than 2 sulfur atoms, and where the ring system itself can be substituted by C₁-C₆alkyl, C₁-C₆haloalkyl, C₁-C₆alkoxy, C₁-C₆haloalkoxy, C₁-C₆alkylthio, C₁-C₆alkylsulfinyl, C₁-C₆alkylsulfonyl, di(C₁-C₄alkyl)aminosulfonyl, di(C₁-C₄alkyl)amino, halogen, cyano, nitro or phenyl, and where the substituents on the nitrogen in the heterocyclic ring are different from halogen;

R₂₃, R₂₄, R₂₅, R₂₆, R₂₇, R₂₈, R₂₉, R₃₀ and R₃₃ independently of one another are hydrogen or C₁-C₆alkyl;

or R₂₃ and R₂₄ together or R₂₅ and R₂₆ together or R₂₇ and R₂₈ together or R₂₉ and R₃₀ together are pyrrolidino, piperidino, morpholino, thiomorpholino, which may be mono- or polysubstituted by methyl groups;

or Q is Q₂



in which

R₃₄ is hydrogen, C₁-C₄alkyl, C₁-C₄haloalkyl, C₃-C₆cycloalkyl, C₂-C₄alkenyl, C₂-C₄alkynyl or benzyl, where the phenyl group may be mono- or polysubstituted by C₁-C₆alkyl, C₁-C₆haloalkyl, C₁-C₆alkoxy, C₁-C₆haloalkoxy, halogen, cyano, hydroxyl or nitro;

R₃₅ is hydrogen, C₁-C₄alkyl, C₁-C₄haloalkyl, C₃-C₆cycloalkyl, C₃-C₄alkenyl, C₃-C₄alkynyl or benzyl, where the phenyl group may be mono- or polysubstituted by C₁-C₆alkyl, C₁-C₆haloalkyl, C₁-C₆alkoxy, C₁-C₆haloalkoxy, halogen, cyano, hydroxyl or nitro;

R₃₆ is hydroxyl, O⁻M⁺, where M⁺ is an alkali metal cation or ammonium cation, halogen, C₁-C₁₂alkylsulfonyloxy, amino, C₁-C₄alkylthio, C₁-C₁₂alkylsulfinyl, C₁-C₁₂alkylsulfonyl, C₁-C₁₂haloalkylthio, C₁-C₁₂haloalkylsulfinyl, C₁-C₁₂haloalkylsulfonyl, C₁-C₆alkoxy-C₁-C₆alkylsulfinyl, C₁-C₆alkoxy-C₁-C₆alkylsulfonyl, C₃-C₁₂alkenylthio, C₃-C₁₂alkenylsulfinyl, C₃-C₁₂alkenylsulfonyl, C₃-C₁₂alkynylthio, C₃-C₁₂alkynylsulfinyl, C₃-C₁₂alkynylsulfonyl, C₁-C₄alkoxycarbonyl-C₁-C₄alkylthio, C₁-C₄alkoxycarbonyl-C₁-C₄alkylsulfinyl, C₁-C₄alkoxycarbonyl-C₁-C₄alkylsulfonyl, (C₁-C₄alkoxy)₂P(O)O, C₁-C₄alkyl-(C₁-C₄alkoxy)P(O)O, H(C₁-C₄alkoxy)P(O)O, R₃₇R₃₈N, R₃₉R₄₀NNH, R₄₁R₄₂NC(O)O-, R₄₃R₄₄NC(O)NH-, C₁-C₁₈alkylcarbonyloxy, C₂-C₁₈alkenylcarbonyloxy, C₂-C₁₈alkynylcarbonyloxy, C₃-C₆cycloalkylcarbonyloxy, C₁-C₁₂alkoxycarbonyloxy, C₁-C₁₂alkylthiocarbamoyl, where the alkyl, alkenyl and alkynyl groups may be substituted by halogen, C₁-C₆alkoxy, C₁-C₆alkylthio, C₁-C₆alkylsulfinyl, C₁-C₆alkylsulfonyl or cyano; or

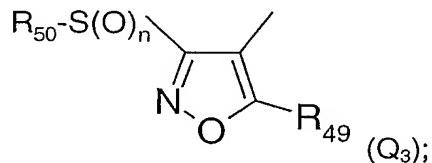
R₃₆ is phenoxy, phenylthio, phenylsulfinyl, phenylsulfonyl, phenylsulfonylamino, phenylsulfonyloxy or benzoxyloxy, where the phenyl groups for their part may be mono- or polysubstituted by halogen, nitro, cyano, C₁-C₄alkyl, C₁-C₄haloalkyl, C₁-C₄alkoxy, C₁-C₄haloalkoxy,

or R₃₆ is a group Het₇-thio, Het₈-sulfinyl, Het₉-sulfonyl, Het₁₀-(CO)O or Het₁₁-N(R₄₇); in which Het₇, Het₈, Het₉, Het₁₀ and Het₁₁ independently of one another are a five- to ten-membered monocyclic or fused bicyclic ring system which may be aromatic or partially saturated and may contain 1 to 4 heteroatoms selected from the group consisting of nitrogen, oxygen and sulfur, and where each ring system may not contain more than 2 oxygen atoms and not more than 2 sulfur atoms, and where the ring system for its part may be substituted by C₁-C₆alkyl, C₁-C₆haloalkyl, C₁-C₆alkoxy, C₁-C₆haloalkoxy, C₁-C₆alkylthio, C₁-C₆alkylsulfinyl, C₁-C₆alkylsulfonyl, di(C₁-C₄alkyl)aminosulfonyl, di(C₁-C₄alkyl)amino, halogen, cyano, nitro or phenyl, and where the substituents on the nitrogen in the heterocyclic ring are different from halogen;

R₃₇, R₃₈, R₃₉, R₄₀, R₄₁, R₄₂, R₄₃, R₄₄ and R₄₇ independently of one another are hydrogen or C₁-C₆alkyl; or

R_{37} and R_{38} together or R_{39} and R_{40} together or R_{41} and R_{42} together or R_{43} and R_{44} together are pyrrolidino, piperidino, morpholino, thiomorpholino, which may be mono- or polysubstituted by methyl groups;

or Q is Q_3



in which

R_{49} is C_1 - C_4 alkyl, C_1 - C_4 haloalkyl, C_3 - C_6 cycloalkyl or halogen-substituted C_3 - C_6 cycloalkyl;

R_{50} is C_1 - C_3 alkylene which may be substituted by halogen, hydroxyl, C_1 - C_6 alkoxy, C_2 - C_6 alkenyl, C_2 - C_6 alkynyl, C_3 - C_6 cycloalkyl, C_1 - C_6 alkoxy- C_1 - C_6 alkoxy, C_1 - C_6 alkoxy- C_1 - C_6 alkoxy, (3-oxetanyl)oxy, or by C_1 - C_6 alkyl-substituted (3-oxetanyl)oxy, or by benzylthio, benzylsulfinyl, benzylsulfonyl, phenyl, phenoxy, phenylthio, phenylsulfinyl or phenylsulfonyl, where the phenyl- and benzyl-containing groups for their part may be substituted by one or more C_1 - C_6 alkyl, C_1 - C_6 haloalkyl, C_1 - C_6 alkoxy, C_1 - C_6 haloalkoxy, halogen, cyano, hydroxyl or nitro groups;

or R_{50} is phenyl, where the phenyl-containing group for its part may be substituted by one or more C_1 - C_6 alkyl, C_1 - C_6 haloalkyl, C_1 - C_6 alkoxy, C_1 - C_6 haloalkoxy, halogen, cyano, hydroxyl or nitro,

or R_{50} is C_3 - C_6 cycloalkyl, C_1 - C_6 alkoxy- or C_1 - C_6 alkyl-substituted C_3 - C_6 cycloalkyl, 3-oxetanyl or C_1 - C_6 alkyl-substituted 3-oxetanyl; and

n is 0, 1 or 2; and agronomically acceptable salts/N-oxides/isomers/enantiomers of these compounds.

The alkyl groups occurring in the definitions of the substituents can be straight-chain or branched and are, for example, methyl, ethyl, n-propyl, isopropyl, n-butyl, sec-butyl, iso-butyl, tert-butyl, pentyl, hexyl, heptyl, octyl, nonyl, decyl, undecyl and dodecyl and their branched isomers. Alkoxy, alkenyl and alkynyl radicals are derived from the alkyl radicals mentioned. The alkenyl and alkynyl groups can be mono- or polyunsaturated.

Halogen is generally fluorine, chlorine, bromine or iodine, preferably fluorine and chlorine. This also applies, correspondingly, to halogen in combination with other meanings, such as haloalkyl or halophenyl.

Haloalkyl groups preferably have a chain length of from 1 to 6 carbon atoms. Haloalkyl is, for example, fluoromethyl, difluoromethyl, trifluoromethyl, chloromethyl, dichloromethyl, trichloromethyl, 2,2,2-trifluoroethyl, 2-fluoroethyl, 2-chloroethyl, pentafluoroethyl, 1,1-difluoro-2,2,2-trichloroethyl, 2,2,3,3-tetrafluoroethyl and 2,2,2-trichloroethyl; preferably trichloromethyl, difluorochloromethyl, difluoromethyl, trifluoromethyl and dichlorofluoromethyl.

Suitable haloalkenyl groups are alkenyl groups which are mono- or polysubstituted by halogen, halogen being fluorine, chlorine, bromine and iodine and in particular fluorine and chlorine, for example 2,2-difluoro-1-methylvinyl, 3-fluoropropenyl, 3-chloropropenyl, 3-bromopropenyl, 2,3,3-trifluoropropenyl, 2,3,3-trichloropropenyl and 4,4,4-trifluorobut-2-en-1-yl. Among the C₃-C₂₀alkenyl groups which are mono-, di- or trisubstituted by halogen, preference is given to those having a chain length of from 3 to 5 carbon atoms.

Suitable haloalkynyl groups are, for example, alkynyl groups which are mono- or polysubstituted by halogen, halogen being bromine, iodine and in particular fluorine and chlorine, for example 3-fluoropropynyl, 3-chloropropynyl, 3-bromopropynyl, 3,3,3-trifluoropropynyl and 4,4,4-trifluorobut-2-yn-1-yl. Among the alkynyl groups which are mono- or polysubstituted by halogen, preference is given to those having a chain length of from 3 to 5 carbon atoms.

In the context of the present invention, the alkali metal cation M⁺ (for example in the definition of R₁₃) is preferably the sodium cation or the potassium cation.

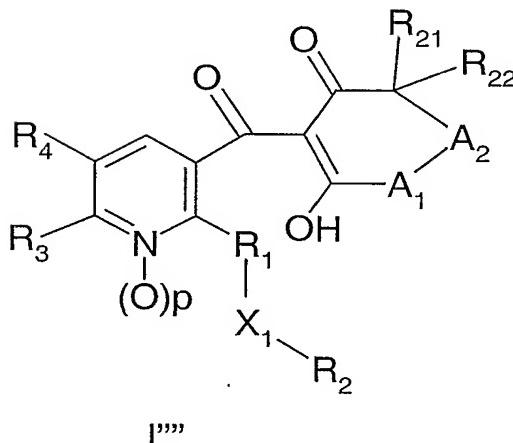
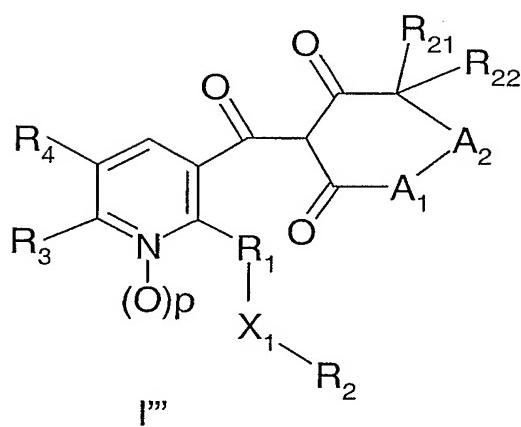
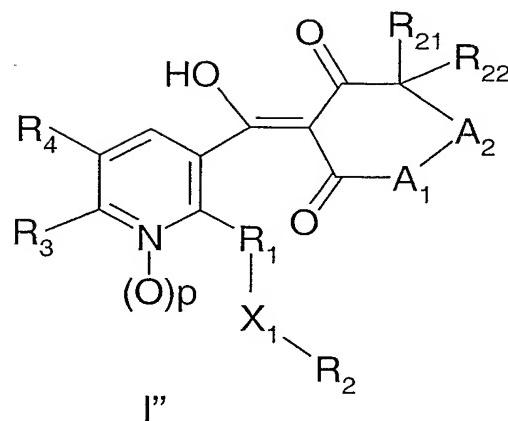
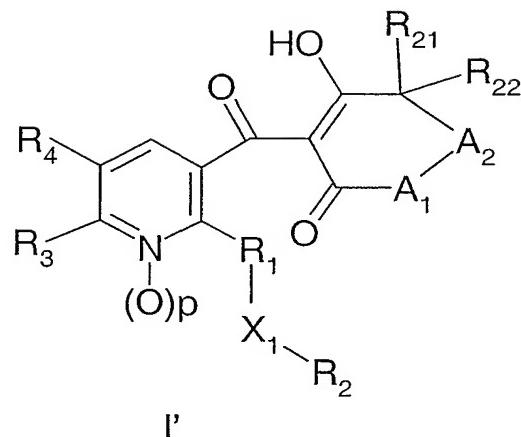
Alkoxy groups preferably have a chain length of from 1 to 6 carbon atoms. Alkoxy is, for example, methoxy, ethoxy, propoxy, i-propoxy, n-butoxy, isobutoxy, sec-butoxy and tert-butoxy and also the isomeric pentyloxy and hexyloxy radicals; preferably methoxy and ethoxy. Alkylcarbonyl is preferably acetyl or propionyl. Alkoxycarbonyl is, for example, methoxycarbonyl, ethoxycarbonyl, propoxycarbonyl, isopropoxycarbonyl, n-butoxycarbonyl, isobutoxycarbonyl, sec-butoxycarbonyl or tert-butoxycarbonyl; preferably methoxycarbonyl or ethoxycarbonyl. Haloalkoxy groups preferably have a chain length of from 1 to 8 carbon

atoms. Haloalkoxy is, for example, fluoromethoxy, difluoromethoxy, trifluoromethoxy, 2,2,2-trifluoroethoxy, 1,1,2,2-tetrafluoroethoxy, 2-fluoroethoxy, 2-chloroethoxy, 2,2-difluoroethoxy and 2,2,2-trichloroethoxy; preferably difluoromethoxy, 2-chloroethoxy and trifluoromethoxy. Alkylthio groups preferably have a chain length of from 1 to 8 carbon atoms. Alkylthio is, for example, methylthio, ethylthio, propylthio, isopropylthio, n-butylthio, isobutylthio, sec-butylthio or tert-butylthio, preferably methylthio and ethylthio. Alkylsulfinyl is, for example, methylsulfinyl, ethylsulfinyl, propylsulfinyl, isopropylsulfinyl, n-butylsulfinyl, isobutylsulfinyl, sec-butylsulfinyl, tert-butylsulfinyl; preferably methylsulfinyl and ethylsulfinyl.

Alkylsulfonyl is, for example, methylsulfonyl, ethylsulfonyl, propylsulfonyl, isopropylsulfonyl, n-butylsulfonyl, isobutylsulfonyl, sec-butylsulfonyl or tert-butylsulfonyl; preferably methylsulfonyl or ethylsulfonyl. Alkoxyalkoxy groups preferably have a chain length of from 1 to 8 carbon atoms. Examples of alkoxyalkoxy groups are: methoxymethoxy, methoxyethoxy, methoxypropoxy, ethoxymethoxy, ethoxyethoxy, propoxymethoxy or butoxybutoxy. Alkylamino is, for example, methylamino, ethylamino, n-propylamino, isopropylamino or the isomeric butylamines. Dialkylamino is, for example, dimethylamino, methylethylamino, diethylamino, n-propylmethylamino, dibutylamino and diisopropylamino. Preference is given to alkylamino groups having a chain length of from 1 to 4 carbon atoms. Alkoxyalkyl groups preferably have a chain length of 1 to 6 carbon atoms. Alkoxyalkyl is, for example, methoxymethyl, methoxyethyl, ethoxymethyl, ethoxyethyl, n-propoxymethyl, n-propoxyethyl, isopropoxymethyl or isoproxyethyl. Alkylthioalkyl groups preferably have from 1 to 8 carbon atoms. Alkylthioalkyl is, for example, methylthiomethyl, methylthioethyl, ethylthiomethyl, ethylthioethyl, n-propylthiomethyl, n-propylthioethyl, isopropylthiomethyl, isopropylthioethyl, butylthiomethyl, butylthioethyl or butylthiobutyl. The cycloalkyl groups preferably have from 3 to 8 ring carbon atoms, for example cyclopropyl, cyclobutyl, cyclopentyl, cyclohexyl, cycloheptyl and cyclooctyl. Phenyl, also as part of a substituent such as phenoxy, benzyl, benzyloxy, benzoyl, phenylthio, phenylalkyl, phenoxyalkyl, may be substituted. In this case, the substituents can be in ortho, meta and/or para position. The preferred substituent positions are the ortho and para positions to the ring attachment point.

The compounds of the formula I may occur in different tautomeric forms, for example, if R₁₃ is hydroxyl, in the preferred formulae I' and I'''

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The invention also embraces the salts which can be formed by compounds of the formula I, preferably with amines, alkali metal and alkaline earth metal bases or quarternary ammonium bases. Suitable salt formers are described, for example, in WO 98/41089.

The invention also embraces the salts which can be formed by the compounds of the formula I with amines, alkali metal and alkaline earth metal bases or quarternary ammonium bases. Among the alkali metal and alkaline earth metal hydroxides, the hydroxides of lithium, sodium, potassium, magnesium or calcium, in particular those of sodium or potassium, may be emphasized as salt formers.

Examples of amines suitable for ammonium salt formation are both ammonia and primary, secondary and tertiary C₁-C₁₈alkylamines, C₁-C₄hydroxyalkylamines and C₂-C₄alkoxyalkylamines, for example methylamine, ethylamine, n-propylamine, isopropylamine, the four isomeric butylamines, n-amylamine, isoamylamine, hexylamine, heptylamine, octylamine,

nonylamine, decylamine, pentadecylamine, hexadecylamine, heptadecylamine, octadecylamine, methylethylamine, methylisopropylamine, methylhexylamine, methylnonylamine, methylpentadecylamine, methyloctadecylamine, ethylbutylamine, ethylheptylamine, ethyloctylamine, hexylheptylamine, hexyloctylamine, dimethylamine, diethylamine, di-n-propylamine, diisopropylamine, di-n-butylamine, di-n-amylamine, diisoamylamine, dihexylamine, diheptylamine, dioctylamine, ethanolamine, n-propanolamine, isopropanolamine, N,N-diethanolamine, N-ethylpropanolamine, N-butylethanolamine, allylamine, n-butenyl-2-amine, n-pentenyl-2-amine, 2,3-dimethylbutenyl-2-amine, dibutenyl-2-amine, n-hexenyl-2-amine, propylenediamine, trimethylamine, triethylamine, tri-n-propylamine, triisopropylamine, tri-n-butylamine, triisobutylamine, tri-sec-butylamine, tri-n-amylamine, methoxyethylamine and ethoxyethylamine; heterocyclic amines, for example pyridine, quinoline, isoquinoline, morpholine, piperidine, pyrrolidine, indoline, quinuclidine and azepine; primary arylamines, for example anilines, methoxyanilines, ethoxyanilines, o,m,p-toluidines, phenylenediamines, benzidines, naphthylamines and o,m,p-chloroanilines; but in particular triethylamine, isopropylamine and diisopropylamine.

Preferred quarternary ammonium bases which are suitable for salt formation correspond, for example, to the formula $[N(R_a R_b R_c R_d)]OH$, in which R_a , R_b , R_c and R_d independently of one another are C_1-C_4 alkyl. Other suitable tetraalkylammonium bases with other anions can be obtained, for example, by anion exchange reactions.

Compounds of formula I, wherein p is 0, are preferred.

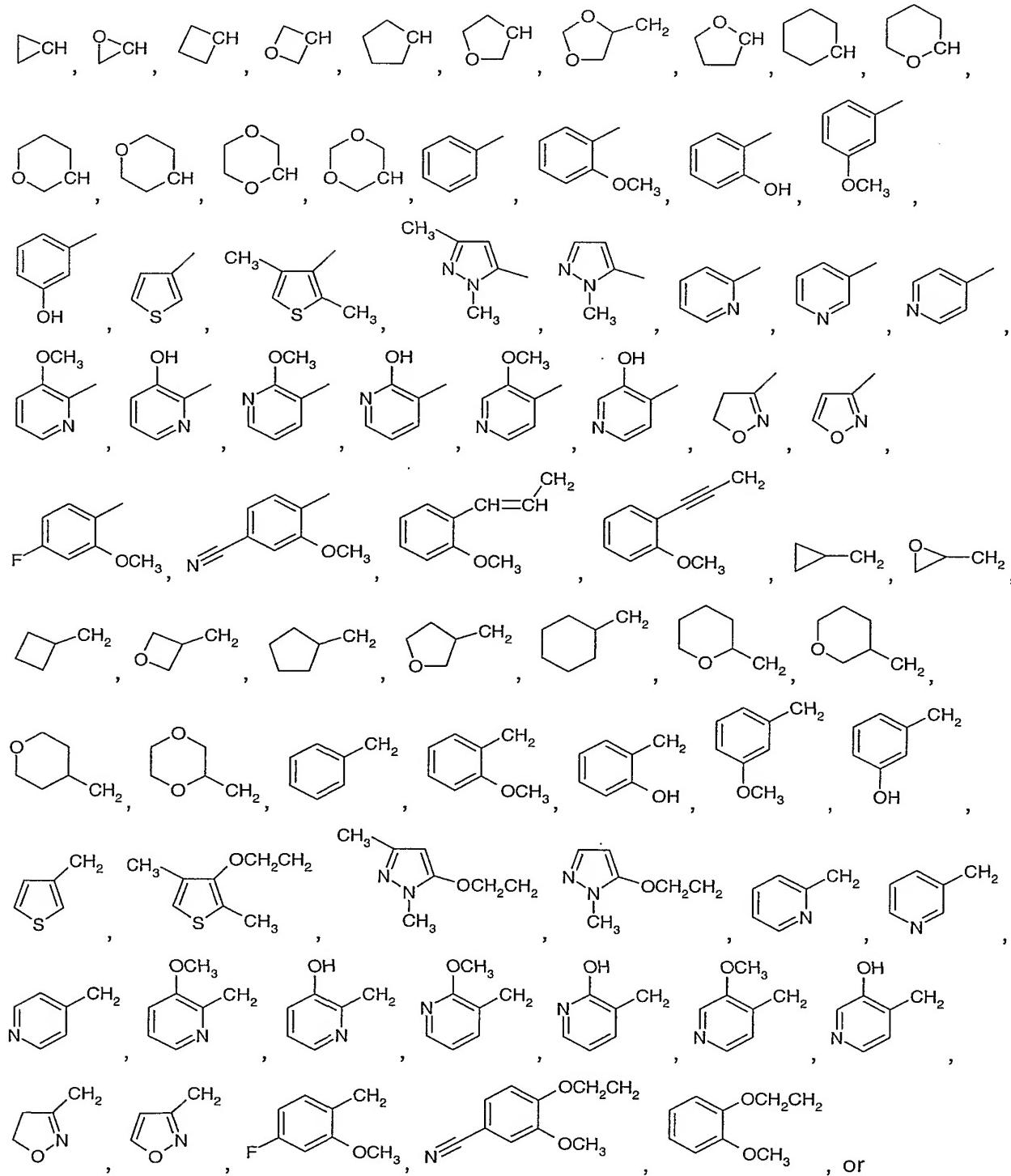
Preferred compounds of the formula I are those in which R_1 is $-CH_2-$, $-CH_2CH_2-$, $-CF_2-$, $-CH=CHCH_2-$, $-CH(CH_3)-$ or $-C\equiv CCH_2-$, but particularly preferably $-CH_2-$ where in each case the free valences on the left are attached to the pyridine ring.

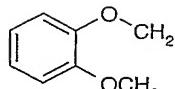
Preference is furthermore given to those compounds of the formula I, in which X_1 is oxygen, sulfonyl or a group $-NR_{52}SO_2-$, in particular oxygen.

Of particular interest are compounds of the formula I, in which R_2 is $-CH_2OCH_3$, $-CH_2OCH_2CH_3$, $-CH_2CH_2OCH_3$, $-CH_2CH_2SO_2CH_3$ or $-CH_2CH_2OCH_2CH_2OCH_3$, preferably $-CH_2CH_2OCH_3$, those compounds standing out in which X_1 is oxygen and R_1 is $-CH_2-$.

Among this group, preference is given to those compounds in which Q is Q_1 and R_{13} is hydroxyl.

Emphasis is furthermore given to the compounds of the formula I in which R_2





If, in these preferred meanings of R₂, no free valency is indicated, as, for

example, in the case of , the point of attachment is the carbon atom indicated by "CH".

In a further preferred group of compounds of the formula I, R₃ is CF₃, CF₂CF₃, CF₂Cl, CF₂H or CCl₃, particularly preferably CF₃, where R₄ is preferably hydrogen or methyl, particularly preferably hydrogen.

R₆, R₇, R₈, R₉, R₁₀, R₁₁, R₁₂, R₅₁ and R₅₂ independently of one another are in particular hydrogen, C₁-C₄alkyl, C₁-C₆alkoxy-C₁-C₆alkyl or C₁-C₆alkoxy-C₁-C₆alkyl which is substituted by C₁-C₆alkoxy, where in a preferred group of compounds of the formula I additionally Q is Q₂ and R₁ is methylene.

Very particularly preferably, Q is Q₁ and R₁₃ is hydroxyl or halogen, in particular hydroxyl.

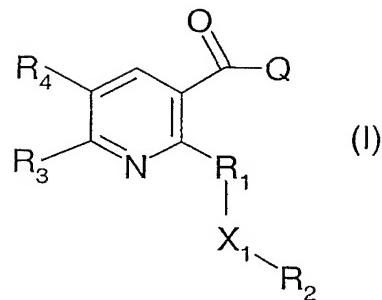
Among this group, emphasis is given to those compounds in which

- a) A₁ is C(R₁₄R₁₅) or NR₁₆ and A₂ is C(R₁₇R₁₈), C(O) or oxygen, or
- b) A₁ is C(R₁₄R₁₅) and A₂ is C(R₁₇R₁₈) and R₁₄ and R₂₂ together form a C₂-C₃alkylene chain, preferably an ethylene chain, where R₁₅, R₁₇, R₁₈ and R₂₁ are particularly preferably hydrogen; or
- c) A₂ is C(O) or C(R₁₇R₁₈), A₁ is C(R₁₄R₁₅) and R₁₄, R₁₅, R₁₇ and R₁₈ independently of one another are hydrogen, methyl, ethyl, methoxycarbonyl or ethoxycarbonyl; or
- d) R₁₄ and R₁₅ or R₂₁ and R₂₂ together form a C₂alkylene chain (cyclopropyl ring), A₂ is CH₂ and R₂₁ and R₂₂ or R₁₄ and R₁₅ independently of one another are hydrogen, C₁-C₄alkyl, methoxycarbonyl or ethoxycarbonyl; or
- e) A₂ is C(R₁₇R₁₈) and A₁ is C(R₁₄R₁₅) and R₁₈ and R₁₄ together form a C₂-C₃alkylene chain.

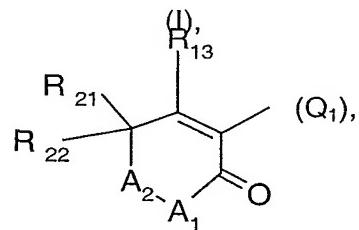
In a further outstanding group of compounds of the formula I, Q is Q₃, R₄₉ is cyclopropyl and R₅₀-S(O)_n is methylthio, ethylthio, methylsulfinyl, ethylsulfinyl, methylsulfonyl or ethylsulfonyl.

The compounds of the formula I can be prepared by processes known per se, for example those described in WO 97/46530 or WO 00/15615 or WO/0039094, for example in the case of compounds of the formula I,

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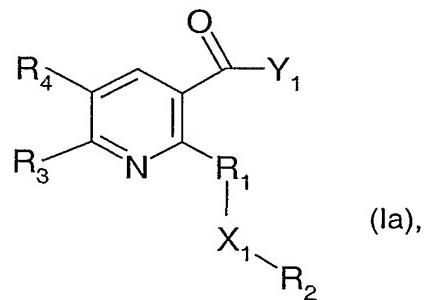


in which R_1 , R_2 , R_3 , R_4 and X_1 are as defined under formula I and Q is a group



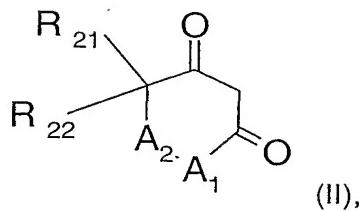
by, for example, either

a) reacting a compound of the formula Ia

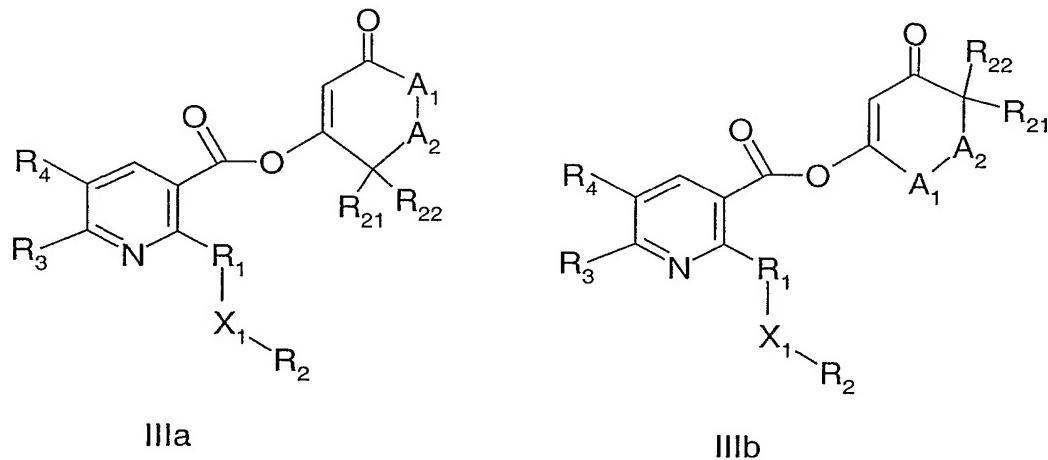


in which R_1 , R_2 , R_3 , R_4 and X_1 are as defined under formula I and Y_1 is a leaving group, for example halogen or cyano, in an inert organic solvent in the presence of a base with a compound of the formula II

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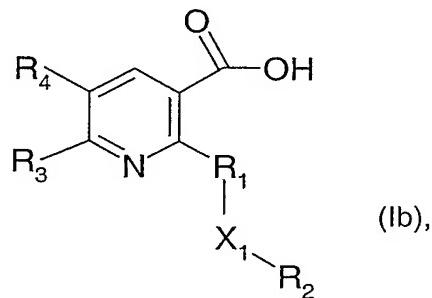
in which R_{22} , R_{21} , A_2 and A_1 are as defined under formula I, to give the compounds of the formulae IIIa and IIIb



IIIa

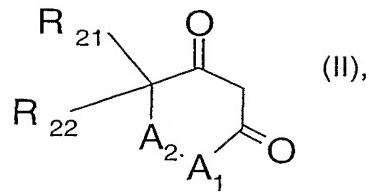
IIIb

and then isomerizing these for example in the presence of a base and a catalytic amount of dimethylaminopyridine (DMAP) or a source of cyanide, for example acetone cyanohydrin; or b) reacting a compound of the formula Ib

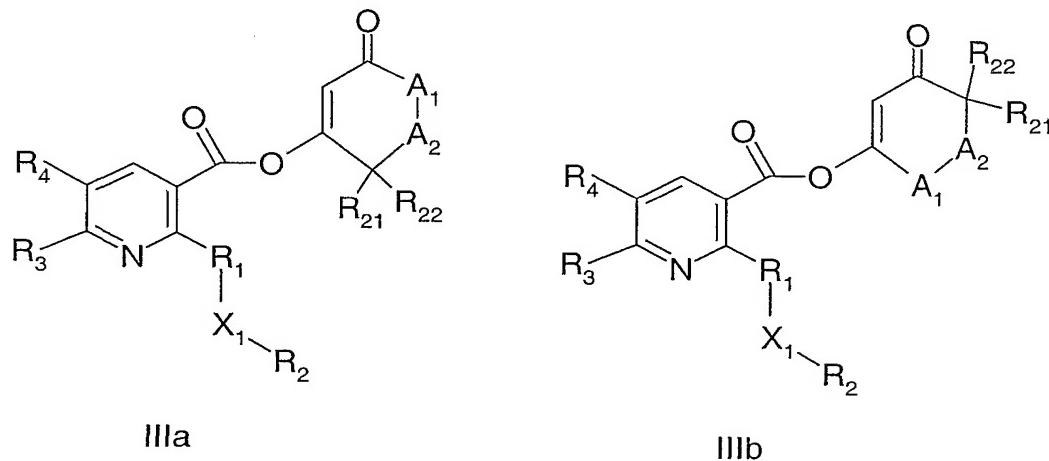


in which R_1 , R_2 , R_3 , R_4 and X_1 are as defined under formula I, with a compound of the formula II

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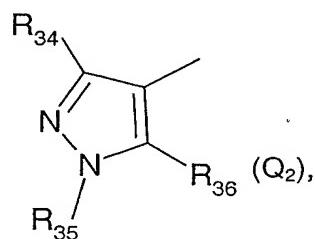


in which R_{22} , R_{21} , A_1 and A_2 are as defined under formula I, in an inert organic solvent in the presence of a base and a coupling agent to give the compounds of the formula IIIa or IIIb



and then isomerizing these, for example as described under route a).

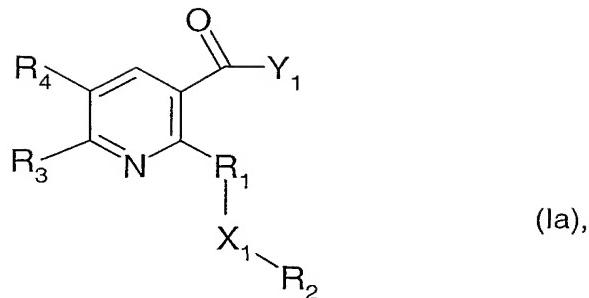
Compounds of the formula I, in which Q is a group



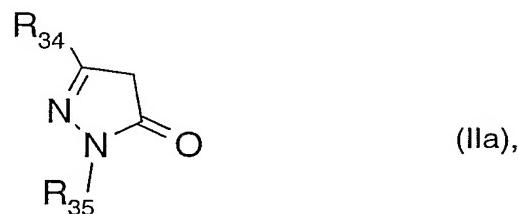
are prepared similarly to a known process (for example WO 97/46530), wherein either

- a) a compound of the formula Ia

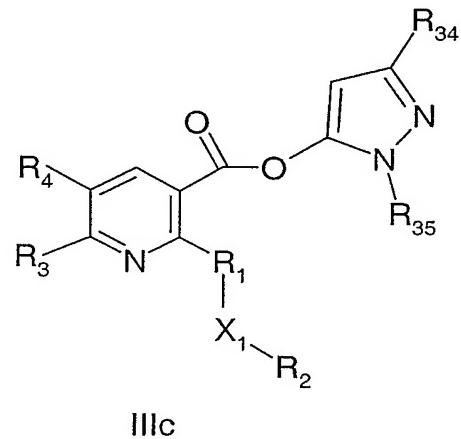
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in which R₁, R₂, R₃, R₄ and X₁ are as defined under formula I and Y₁ is a leaving group, for example halogen or cyano, is reacted with a compound of the formula IIa



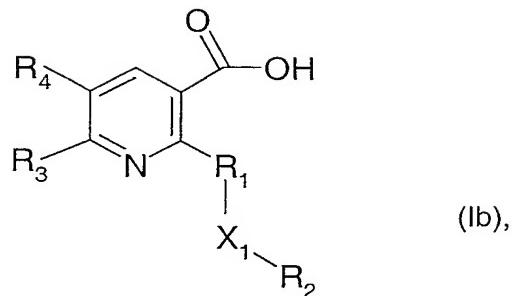
in which R₃₄ and R₃₅ are as defined, in an inert organic solvent in the presence of a base to give the compound of the formula IIIc



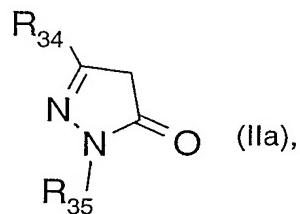
in which R₁, R₂, R₃, R₄, R₃₄, R₃₅ and X₁ are as defined under formula I, and this compound is then isomerized, for example in the presence of a base and a catalytic amount of a source of cyanide; or

b) a compound of the formula Ib

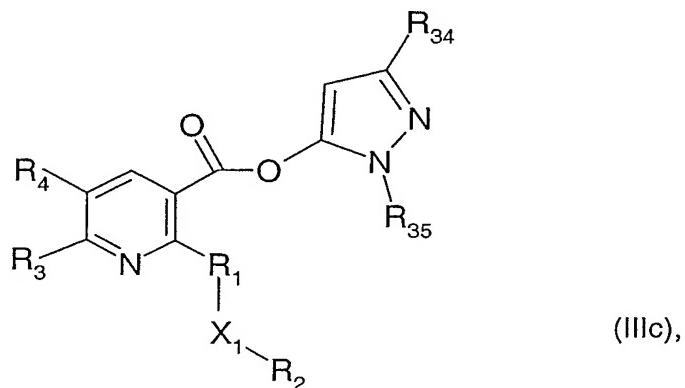
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in which R₁, R₂, R₃, R₄ and X₁ are as defined under formula I, is reacted with a compound of the formula IIa

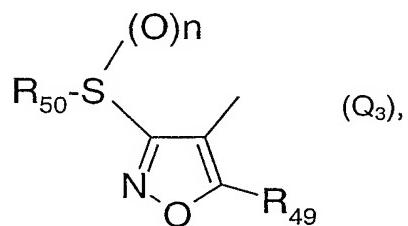


in which R₃₄ and R₃₅ are as defined above, in an inert organic solvent in the presence of a base and a coupling agent to give the compound of the formula IIIc



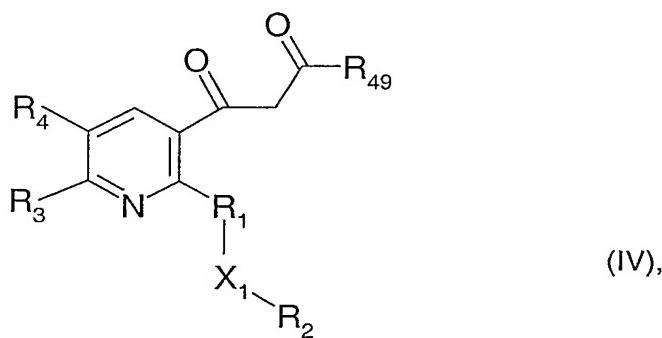
and this compound is then isomerized as described under route a).

The compounds of the formula I, in which Q is a group



in which n is 0 and R₅₀ and R₄₉ are as defined above, are prepared similarly to known processes (for example those described in WO 00/15615, WO/0039094 or WO 97/43270), wherein either

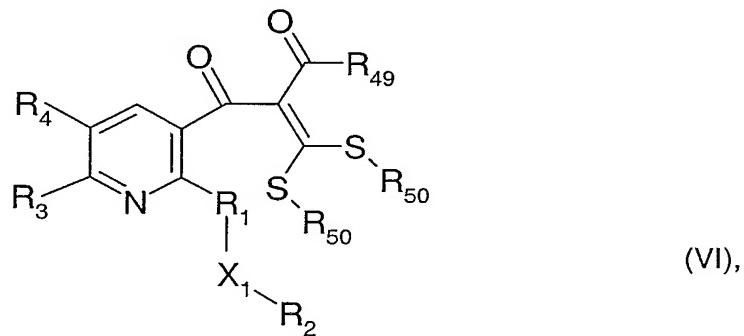
a) a compound of the formula IV



in which X₁, R₁, R₂, R₃, R₄ and R₄₉ are as defined above, is converted in the presence of a base, carbon disulfide and an alkylating agent of the formula V

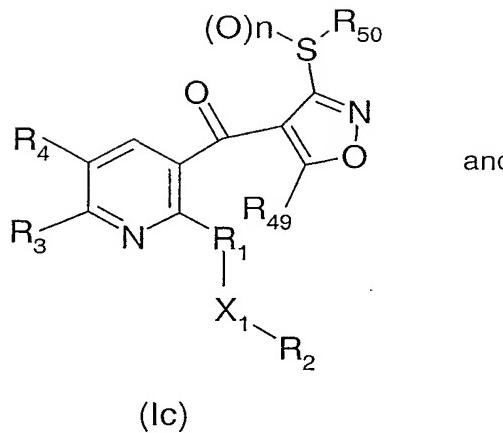


in which R₅₀ is as defined under formula I, and Y₂ is a leaving group, for example halogen or sulfonate, into the compound of the formula VI

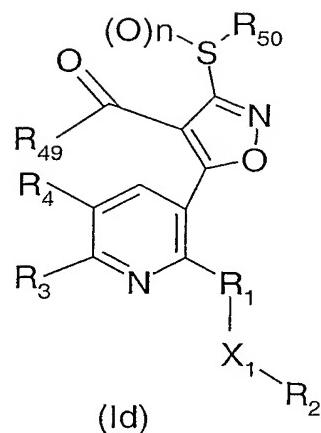


in which R₁, R₂, R₃, R₄, R₅₀, X₁ and R₄₉ are as defined above, and this compound is then cyclized with hydroxylamine hydrochloride, if appropriate in a solvent, in the presence of a base, for example sodium acetate, to give the isomeric compounds of the formulae Ic and Id

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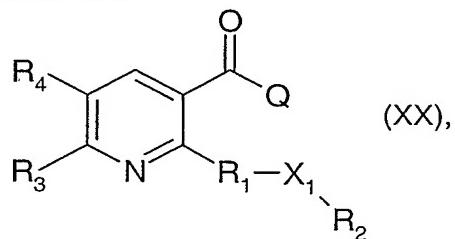


and



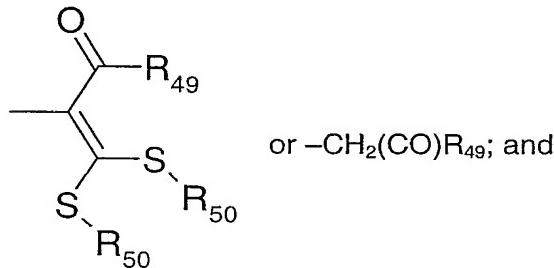
and these compounds are then oxidized with an oxidizing agent, for example with peracids, for example meta-chloroperbenzoic acid (m-CPBA) or peracetic acid, to give the corresponding sulfoxides ($n = 1$) and sulfones ($n = 2$) of the formulae Ie and If, respectively. Isomers of the formulae Ic and Id (in which $n = 0$) or Ie and If (in which $n = 1$ or 2) can be separated and purified by column chromatography, using a suitable mobile phase.

The intermediates of the formulae Ia, Ib, IV and VI are novel and were developed specifically for the preparation of the compounds of the formula I. Accordingly, they also form part of the subject-matter of the present invention. Together, the novel intermediates of the formulae Ia, Ib, IV and VI correspond to formula XX



in which

Q is hydroxyl, halogen, cyano or C_1-C_6 alkoxy, or is a group of the formula



R₁, R₃, R₄, R₄₉, R₅₀, X₁ and p are as defined under formula I and R₂ is a C₁-C₈alkyl, C₃-C₆alkenyl or C₃-C₆alkynyl group which is mono- or polysubstituted by halogen, hydroxyl, amino, formyl, nitro, cyano, mercapto, carbamoyl, C₁-C₆alkoxy, C₁-C₆alkoxycarbonyl, C₂-C₆alkenyl, C₂-C₆haloalkenyl, C₂-C₆alkynyl, C₂-C₆haloalkynyl, C₃-C₆cycloalkyl, by halogen-substituted C₃-C₆cycloalkyl, or by C₃-C₆alkenyloxy, C₃-C₆alkynyloxy, C₁-C₆haloalkoxy, C₃-C₆haloalkenyloxy, cyano-C₁-C₆alkoxy, C₁-C₆alkoxy-C₁-C₆alkoxy, C₁-C₆alkoxy-C₁-C₆alkoxy-C₁-C₆alkoxy, C₁-C₆alkylthio-C₁-C₆alkoxy, C₁-C₆alkylsulfinyl-C₁-C₆alkoxy, C₁-C₆alkylsulfonyl-C₁-C₆alkoxy, C₁-C₆alkoxycarbonyl-C₁-C₆alkoxy, C₁-C₆alkoxycarbonyl, C₁-C₆alkylcarbonyl, C₁-C₆alkylthio, C₁-C₆alkylsulfinyl, C₁-C₆alkylsulfonyl, C₁-C₆haloalkylthio, C₁-C₆haloalkylsulfinyl, C₁-C₆haloalkylsulfonyl, oxiranyl, which for its part may be substituted by C₁-C₆alkyl, or by benzylthio, benzylsulfinyl, benzylsulfonyl, C₁-C₆alkylamino, di(C₁-C₆alkyl)amino, R₉S(O)₂O, R₁₀N(R₁₁)SO₂⁻, thiocyanato, phenyl, phenoxy, phenylthio, phenylsulfinyl or phenylsulfonyl; where the phenyl- or benzyl-containing groups for their part may be substituted by one or more C₁-C₆alkyl, C₁-C₆haloalkyl, C₁-C₆alkoxy, C₁-C₆haloalkoxy, halogen, cyano, hydroxyl or nitro groups, or

R₂ is phenyl which may be mono- or polysubstituted by C₁-C₆alkyl, C₁-C₆haloalkyl, C₁-C₆alkoxy, C₁-C₆haloalkoxy, halogen, cyano, hydroxyl or nitro; or

R₂ is C₃-C₆cycloalkyl, C₁-C₆alkoxy- or C₁-C₆alkyl-substituted C₃-C₆cycloalkyl, 3-oxetanyl or C₁-C₆alkyl-substituted 3-oxetanyl;

or

if X₁ is -N(R₆)-O-, -O-NR₅₁, SO₂NR₇- or -NR₅₂SO₂⁻ and R₆, R₇, R₅₁ and R₅₂ are as defined under formula I,

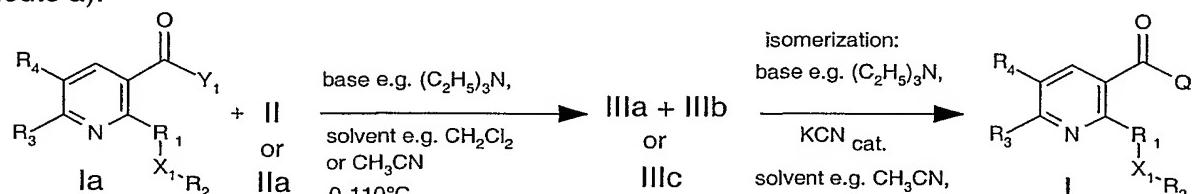
R₂ may additionally be hydrogen, unsubstituted C₁-C₆alkyl, or a five- to ten-membered monocyclic or fused bicyclic ring system which may be aromatic, saturated or partially saturated and may contain 1 to 4 heteroatoms selected from the group consisting of nitrogen, oxygen and sulfur, where the ring system is attached directly or via a C₁-C₄alkylene, C₂-C₄alkenyl-C₁-C₄alkylene, C₂-C₄alkynyl-C₁-C₄alkylene, -N(R₁₂)-C₁-C₄alkylene, -SO-C₁-C₄alkylene or -SO₂-C₁-C₄alkylene group to the substituent X₁, and where each ring system may not contain more than 2 oxygen atoms and not more than two sulfur atoms, and where the ring system for its part may be mono-, di- or trisubstituted by C₁-C₆alkyl, C₁-C₆haloalkyl, C₂-C₆alkenyl, C₂-C₆haloalkenyl, C₂-C₆alkynyl, C₂-C₆haloalkynyl, C₁-C₆alkoxy, hydroxyl, C₁-C₆haloalkoxy, C₃-C₆alkenyloxy, C₃-C₆alkynyloxy, mercapto, C₁-C₆alkylthio, C₁-C₆haloalkylthio, C₃-C₆alkenylthio, C₃-C₆haloalkenylthio,

C₃-C₆alkynylthio, C₂-C₅alkoxyalkylthio, C₃-C₅acetylalkylthio, C₃-C₆alkoxycarbonylalkylthio, C₂-C₄cyanooalkylthio, C₁-C₆alkylsulfinyl, C₁-C₆haloalkylsulfinyl, C₁-C₆alkylsulfonyl, C₁-C₆haloalkylsulfonyl, aminosulfonyl, C₁-C₂alkylaminosulfonyl, di(C₁-C₂alkyl)aminosulfonyl, di(C₁-C₄alkyl)amino, halogen, cyano, nitro, phenyl and benzylthio, where phenyl and benzylthio for their part may be substituted on the phenyl ring by C₁-C₃alkyl, C₁-C₃haloalkyl, C₁-C₃alkoxy, C₁-C₃haloalkoxy, halogen, cyano or nitro, and where the substituents on the nitrogen in the heterocyclic ring are different from halogen.

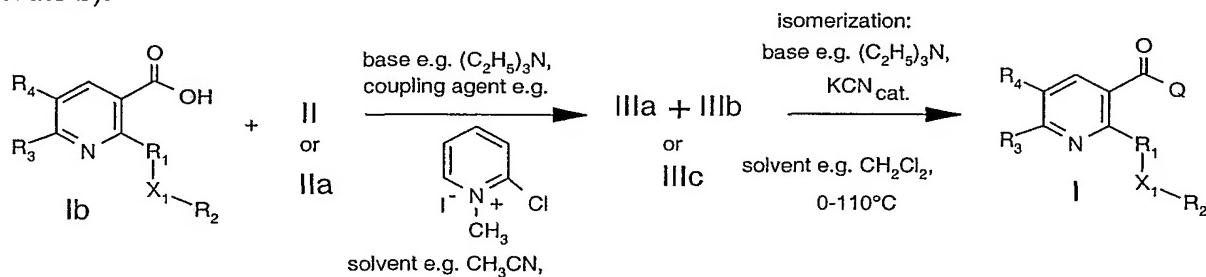
The preparation of the compounds of the formula I is illustrated in more detail in reaction schemes 1 and 2 below.

Reaction scheme 1

Route a):



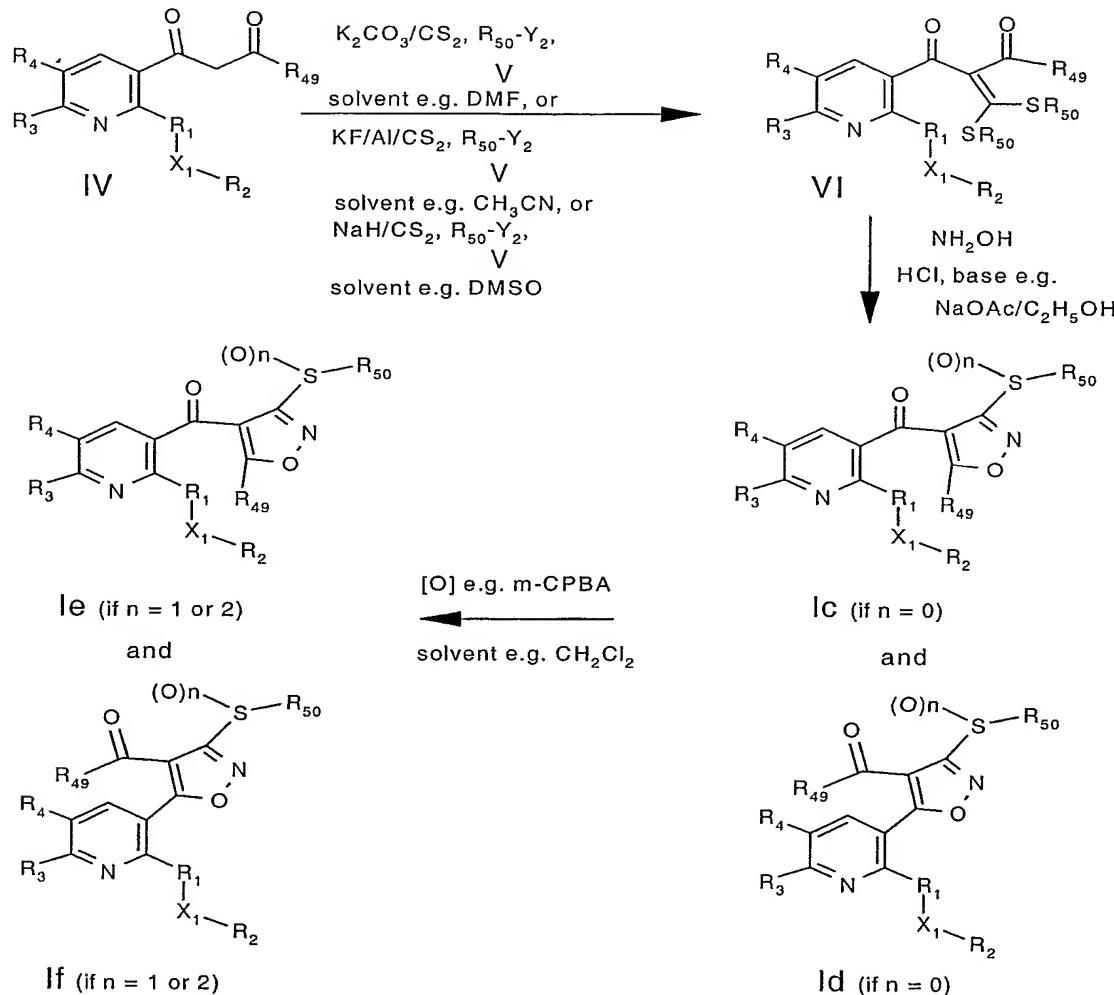
Route b):



Reaction scheme 1 is preferably used to prepare the compounds of the formula I having the group Q₁, in which R₁₃ is hydroxyl, and the compounds of the formula I having the group Q₂, in which R₃₆ is hydroxyl.

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Reaction scheme 2



Compounds of the formula I, in which p is 1, i.e. the corresponding N-oxides of the formula I, can be prepared by reacting a compound of the formula I, in which p is 0, with a suitable oxidizing agent, for example the H₂O₂/urea adduct in the presence of an acid anhydride, e.g. trifluoroacetic anhydride. Such oxidations are known from the literature, for example from *J. Med. Chem.*, 32 (12), 2561-73, 1989 or WO 00/15615.

According to reaction scheme 1, route a), the carboxylic acid derivatives of the formula Ia in which Y_1 is a leaving group such as halogen, for example iodine, bromine, and in particular chlorine, N-oxyphthalimide or N,O-dimethylhydroxylamino or part of an activated ester, for example  (formed from dicyclohexylcarbodiimide (DCC) and the

corresponding carboxylic acid) or $\text{C}_2\text{H}_5\text{N}=\underset{\text{O}}{\overset{|}{\text{C}}}-\text{NH}(\text{CH}_2)_3\text{N}(\text{CH}_3)_2$ (formed from N-ethyl N'-(3-dimethylaminopropyl)carbodiimide (EDC) and the corresponding carboxylic acid) are used as starting materials for preparing the compounds of the formula I in which Q denotes the groups Q₁ and Q₂ and R₁₃ and R₃₆ are hydroxyl. The starting materials are reacted in an inert organic solvent such as a halogenated hydrocarbon, for example dichloromethane, a nitrile, for example acetonitrile, or an aromatic hydrocarbon, for example toluene, and in the presence of a base such as an alkylamine, for example triethylamine, an aromatic amine, for example pyridine or 4-dimethylaminopyridine (DMAP) with the dione derivatives of the formula II or pyrazoles of the formula IIa, to give the isomeric enol ethers of the formula IIIa, IIIb or IIIc. This esterification can be carried out at temperatures of from 0°C to 110°C.

The isomerization of the ester derivatives of the formulae IIIa, IIIb and IIIc to derivatives of the formula I (in which R₁₃ and R₃₆ are hydroxyl) can be carried out, for example, similarly to EP-A-0 353 187, EP-A-0 316 491 or WO 97/46530 in the presence of a base such as an alkylamine, for example triethylamine, a carbonate, for example potassium carbonate, and a catalytic amount of DMAP or a source of cyanide, such as acetone cyanohydrin or potassium cyanide. In particular if a cyanide compound of the formula Ia (Y₁ = cyano) is used, or in the presence of a catalytic amount of acetone cyanohydrin or potassium cyanide, the two reaction steps can be carried out *in situ* without isolating the intermediates III.

According to reaction scheme 1, route b), the desired derivatives of the formula I (in which R₁₃ and R₃₆ are hydroxyl) can be obtained, for example, similarly to E. Haslem, *Tetrahedron*, 2409-2433, 36, 1980, by esterifying the carboxylic acids of the formula Ib with the dione derivatives of the formula II or pyrazoles of the formula IIa in an inert solvent such as a halogenated hydrocarbon, for example dichloromethane, a nitrile, for example acetonitrile, or an aromatic hydrocarbon, for example toluene, in the presence of a base such as an alkylamine, for example triethylamine, and a coupling agent such as 2-chloro-1-methyl-pyridinium iodide. Depending on the solvent used, this esterification is carried out at temperatures of from 0°C to 110°C, giving initially, as described under route a), the isomeric ester of the formula IIIa, IIIb or IIIc, which can be isomerized as described under route a), for example in the presence of a base and a catalytic amount of DMAP, or a source of cyanide, for example acetone cyanohydrin, to give the desired derivative of the formula I (R₁₃ and R₃₆ = hydroxyl). The activated carboxylic acid derivatives of the formula Ia in reaction scheme 1 (route a), in which Y₁ is a leaving group such as halogen, for example bromine, iodine or, in particular, chlorine, can be prepared by known standard processes, for example

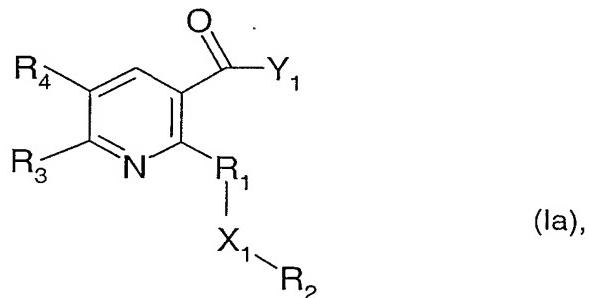
those described in C. Ferri "Reaktionen der organischen Synthese" [Reactions of organic synthesis], Georg Thieme Verlag, Stuttgart, 1978, page 460 ff. Such reactions are generally known and described in the literature in different variations with respect to the leaving group Y_1 .

The preparation of the compounds of the formula I, in which Q denotes the group Q_3 , can be carried out according to reaction scheme 2 by reacting the β -diketone derivative of the formula IV for example similarly to *Synthesis* 1991, 301; *ibid.* 1988, 793; or *Tetrahedron* 32, 3055, 1976, with carbon disulfide in the presence of a base such as a carbonate, for example potassium carbonate, a metal hydride, for example sodium hydride, or potassium fluoride on aluminum, and an alkylating agent of the formula V, in which Y_2 is a leaving group such as halogen, for example iodine, bromine and, in particular, chlorine, $CH_3SO_2O^-$ or

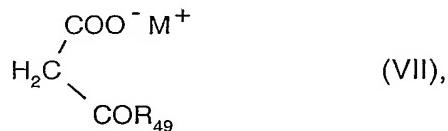


amide, for example N,N-dimethylformamide (DMF), a sulfoxide, for example dimethyl sulfoxide (DMSO), or a nitrile, for example acetonitrile. The ketene thioacetal of the formula VI that is formed is cyclized with the aid of hydroxylamine hydrochloride in the presence of a base such as sodium acetate in a solvent such as an alcohol, for example ethanol, or an ether, for example tetrahydrofuran, to give the isomeric compounds of the formulae Ic and Id (in which n is 0). This cyclization reaction is carried out at temperatures of from 0°C to 100°C. If appropriate, the compounds of the formulae Ic and Id in which n is 0 can be oxidized similarly to known standard processes as described, for example, in H. O. House, "Modern Synthetic Reactions", W. A. Benjamin, Inc., Menlo Park, California, 1972, pages 334-335 and 353-354, to give the corresponding sulfones and sulfoxides of the formulae Ie and If (n = 1 or 2).

The compounds of the formula IV in reaction scheme 2 can be obtained by standard processes for example from the corresponding compounds of the formula Ia



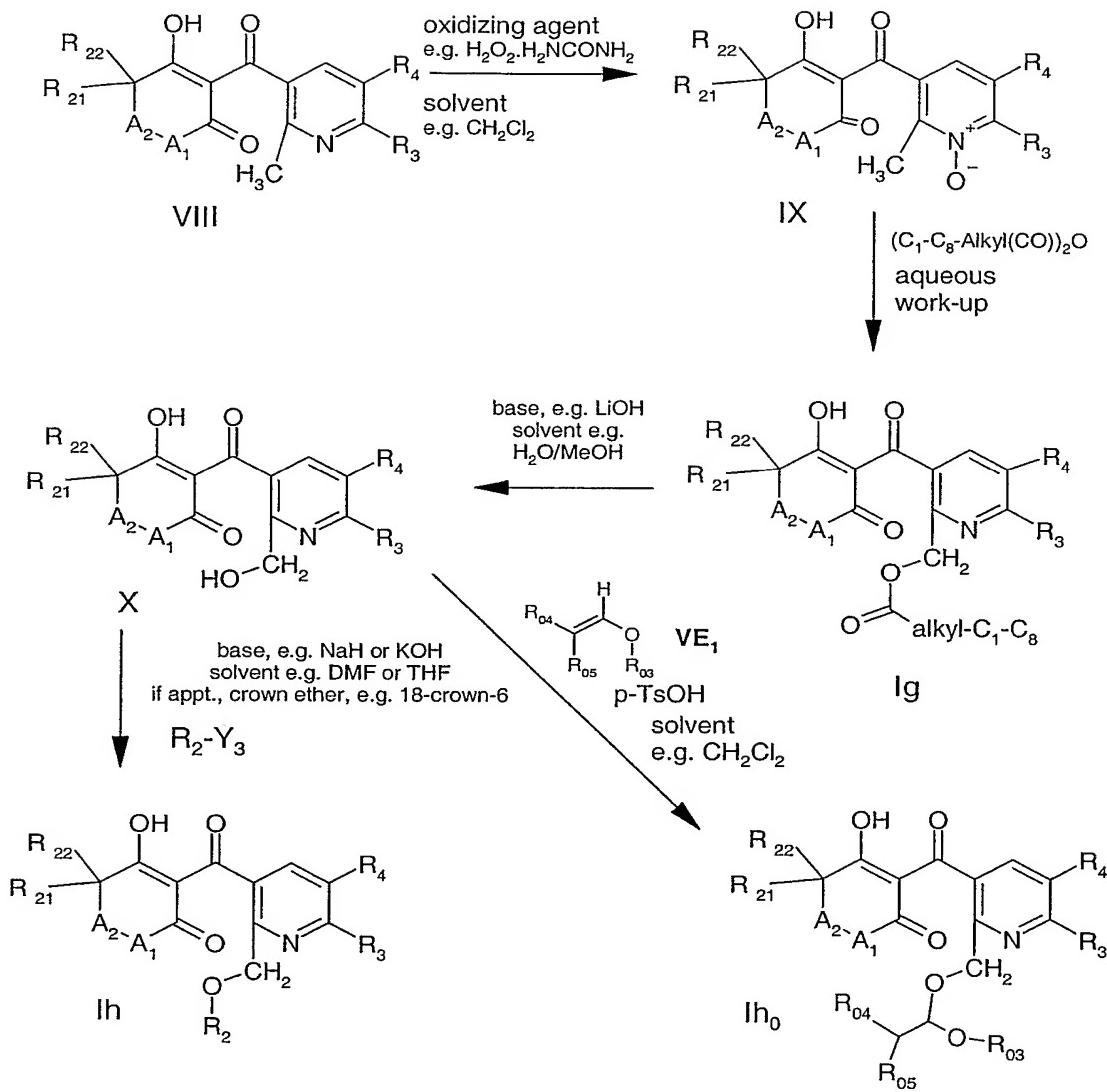
in which R₁, R₂, R₃, R₄, and X₁ are as defined above and Y₁ is a leaving group, for example halogen, for example by Claisen condensation, or from the compounds of the formula Ia by reaction with a ketocarboxylic acid salt of the formula VII



in which R₄₉ is as defined under formula I and M⁺ is an alkali metal ion (cf., for example, WO 96/26192).

Compounds of the formula I, in which R₁ is, in particular C₁-C₂alkyl, can, for example, also be prepared by heating an N-oxide of the formula IX under known reaction conditions in the presence of an acid anhydride (see, for example, Konno, K.; Hashimoto, K.; Shirahama, H.; Matsumoto, T.; *Heterocycles* 1986, 24, 2169, or WO 00/15615) and hydrolyzing the resulting products (Ig) in a protic solvent, for example water or a water/methanol mixture, if appropriate in the presence of a base (for example lithium hydroxide or sodium hydroxide), and then converting the resulting alcohol X in the presence of a base, for example sodium hydride or potassium hydroxide, if appropriate in the presence of a phase-transfer catalyst or a crown ether, and an alkylating agent R₂-Y₃, in which R₂ is as defined under formula I and Y₃ is a leaving group, for example halogen or methyl sulfonate, in an aprotic solvent, for example, tetrahydrofuran or dimethylformamide, into the corresponding derivatives of the formula Ih (in which X₁ is oxygen). Compounds of the formula I, in which R₂ is C₁-C₆alkoxymethyl or 2-tetrahydropyranyl or 2-tetrahydrofuryl, can be prepared, for example, by treating an alcohol of the formula X with a vinyl ether of the formula VE₁, in which R₀₃, R₀₄, and R₀₅ are C₁-C₆alkyl or R₀₃ together with R₀₅ forms a C₂-C₃alkylene chain, in the presence of an acidic catalyst, for example para-toluenesulphonic acid, in an inert solvent, for example methylene chloride. Such reactions are generally known in the literature (see, for example, *Synthesis*, p. 169, 1973). The two reaction sequences are demonstrated using the example below:

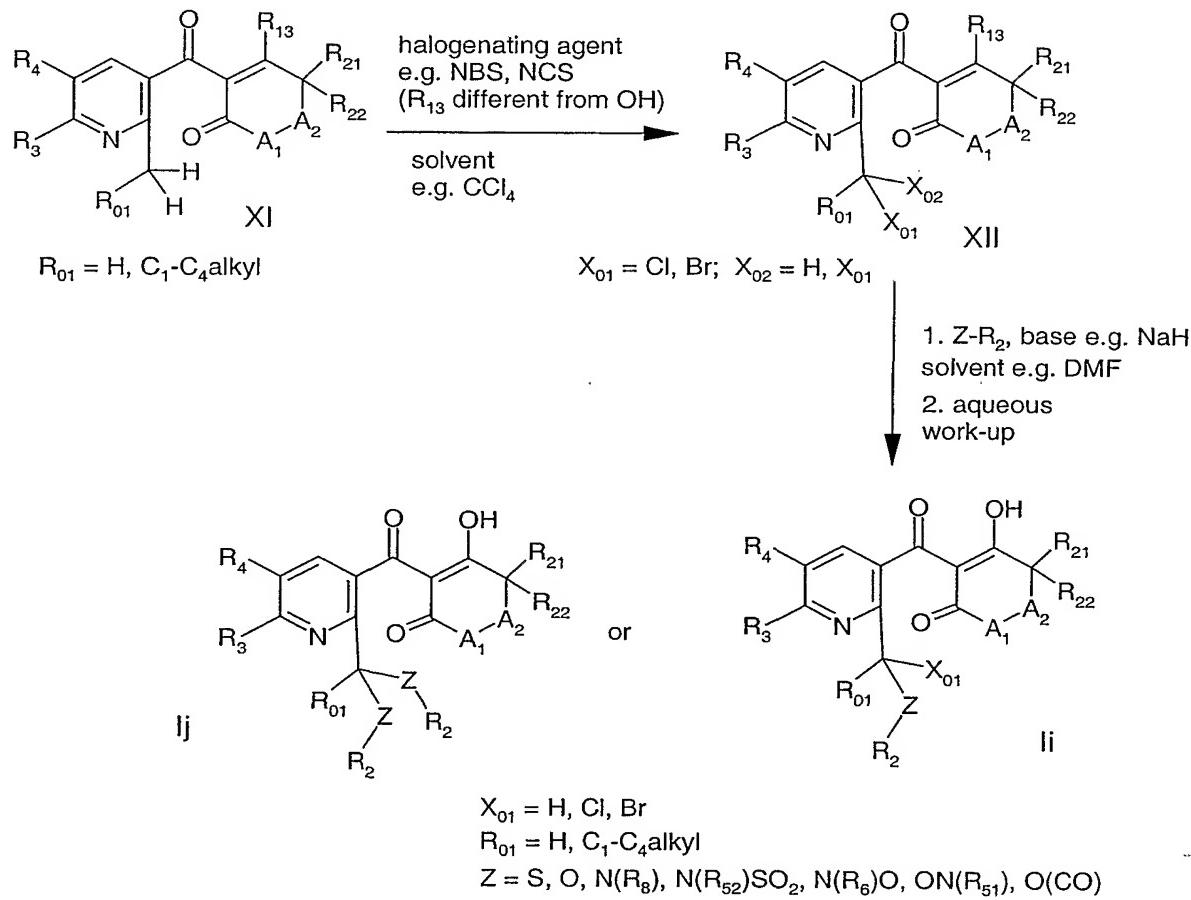
Reaction scheme 3



Compounds of the formula **I**, in which R_1 is, in particular, $\text{C}_1\text{-C}_2\text{alkyl}$ or $\text{C}_1\text{-C}_2\text{haloalkyl}$, can, for example, also be prepared by oxidizing a compound of the formula **XI**, in which R_{13} is in particular chlorine, $\text{C}_1\text{-C}_4\text{alkoxycarbonyloxy}$ or $\text{benzoylcarbonyloxy}$ (prepared similarly to WO 00/15615 or WO/0039094), under known halogenation conditions using, for example, N -bromosuccinimide or N -chlorosuccinimide in the presence of light and a free-radical initiator such as benzoyl peroxide to give the 1-bromo or 1-chloro, 1,1-dibromo or 1,1-dichloro compound and then refunctionalizing these compounds into the corresponding derivatives of the formula **I**, for example by reaction with a nucleophile $\text{R}_2\text{-Z}$, in which Z is, for example, $-\text{SH}$, $-\text{OH}$, $-\text{C}(\text{O})\text{OH}$, $-\text{O-N}(\text{R}_{51})\text{H}$, $-\text{N}(\text{R}_6)\text{-OH}$, $-\text{SO}_2\text{N}(\text{R}_{52})\text{H}$ or $-\text{N}(\text{R}_8)\text{H}$ and R_2 , R_{52} ,

R_8 , R_6 and R_{51} are as defined under formula I, in the presence of a base, for example sodium hydride, potassium hydroxide or potassium carbonate, followed by aqueous work-up. These reaction sequences, too, are demonstrated by the example below.

Reaction scheme 4

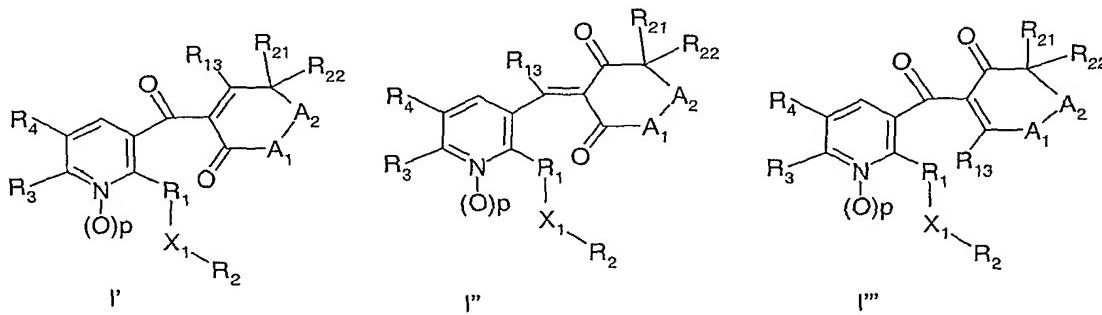


Compounds of the formula I, in which Q denotes Q_1 or Q_2 and in which R_{13} or R_{36} are different from hydroxyl or halogen, can be prepared by conversion processes generally known from the literature, for example acylations or carbamoylations with appropriate acid chlorides from compounds of the formula I, in which R_{13} or R_{36} is hydroxyl, in the presence of a suitable base, or they can be prepared by nucleophilic substitution reactions on chlorides of the formula I, in which R_{13} and R_{36} are chlorine, the chlorides likewise being obtainable according to known processes by reaction with a chlorinating agent, such as phosgene, thionyl chloride or oxalyl chloride. The starting materials used are, for example, appropriately substituted amines, or hydroxylamines directly, or alkylsulfonamides, mercaptans,

thiophenols, phenols, heterocyclic amines or heterocyclic thiols in the presence of a base, for example 5-ethyl-2-methylpyridine, diisopropylethylamine, triethylamine, sodium bicarbonate, sodium acetate or potassium carbonate.

Compounds of the formula I, in which R₁₃ and R₃₆ contain thio groups, can be oxidized similarly to known standard processes using, for example, peracids, for example meta-chloroperbenzoic acid (m-CPBA) or peracetic acid, to give the corresponding sulfones and sulfoxides of the formula I. The degree of oxidation at the sulfur atom (SO⁻ or SO₂⁻) can be controlled by the amount of oxidizing agent.

The resulting derivatives of the formula I, in which R₁₃ and R₃₆ are different from hydroxyl, can likewise occur in different isomeric forms which, if appropriate, can be isolated in pure form. Accordingly, the invention also embraces all of these stereoisomeric forms. Examples of these isomeric forms are the formulae I*, I** and I*** below in which Q denotes the group Q₁.

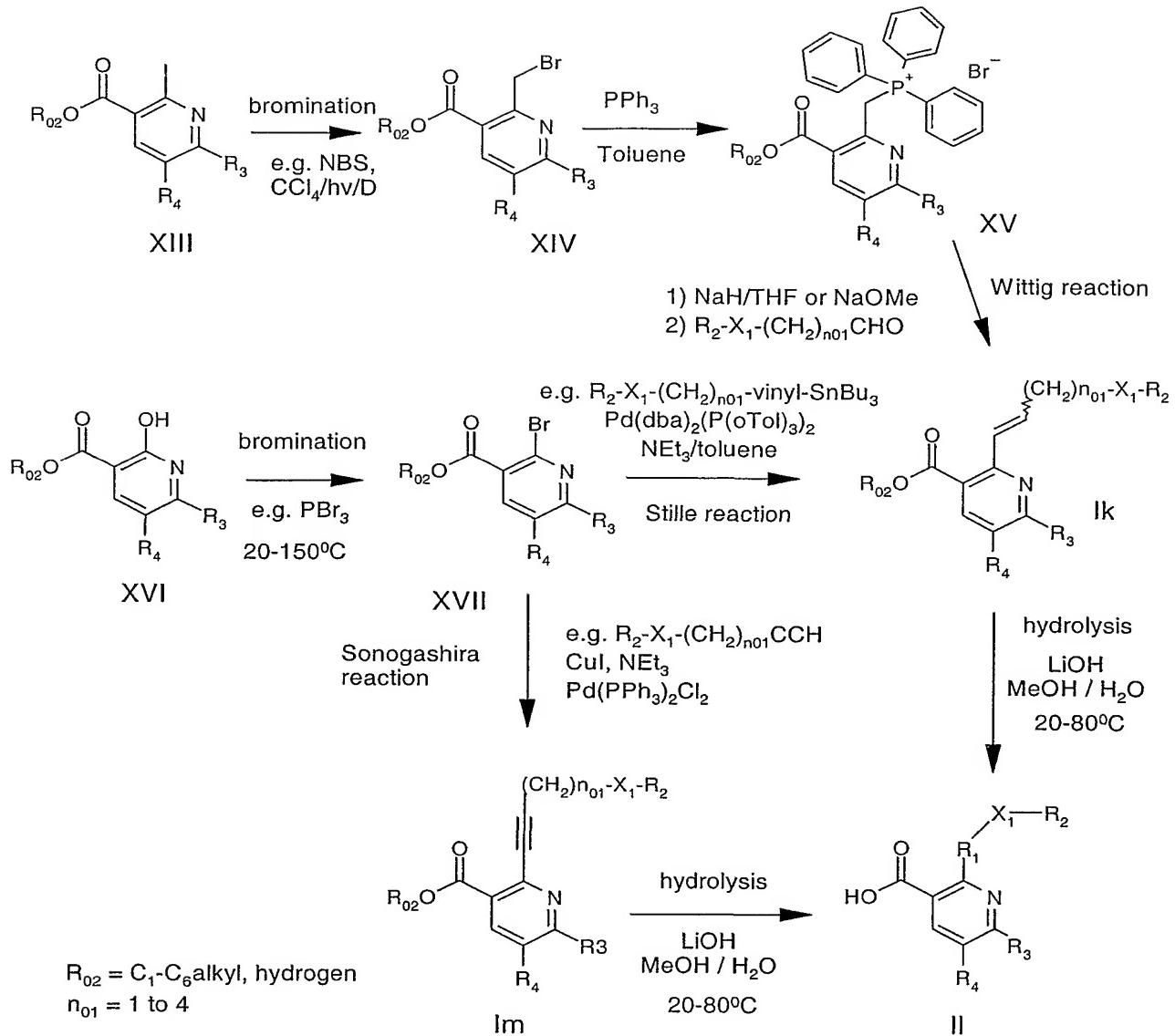


The compounds of the formulae II and IIa are known and can be prepared similarly as described, for example, in WO 92/07837, JP 10265441, DE-A-3818958, EP-A-0 338 992, DE-A-3902818, EP-A-0 278 742, WO 98/29412, JP 02059566, US-A-5,089,046, GB-A-2205316, WO 00/27821 or EP-A-0 384 736.

The required intermediates of the formula Ib (or lk, II or Im) are synthesized similarly to known processes as described, for example, in WO 00/15615, WO/00/39094 or WO 97/46530, or they can be prepared for example, according to generally known conversion methods such as the Stille (see, for example *Angew. Chem.* **1986**, 98(6), 504-19), Heck (see, for example, *Angew. Chem.* **1994**, 106 (23/24), 2473-506), Sonogashira (see, for example, "Comprehensive Organometallic Synthesis", Pergamon Verlag, Oxford, Vol 3, **1991**, page 521 ff.) or Wittig (for example C. Ferri "*Reaktionen der organischen Synthese*", Georg Thieme Verlag, Stuttgart, **1978**, p. 354 ff.) reactions, starting from halogen derivatives of the formula XIV (preparation as described in WO 00/15615 or WO/0039094) or XVII (preparation similar to EP 522392) (reaction scheme 5):

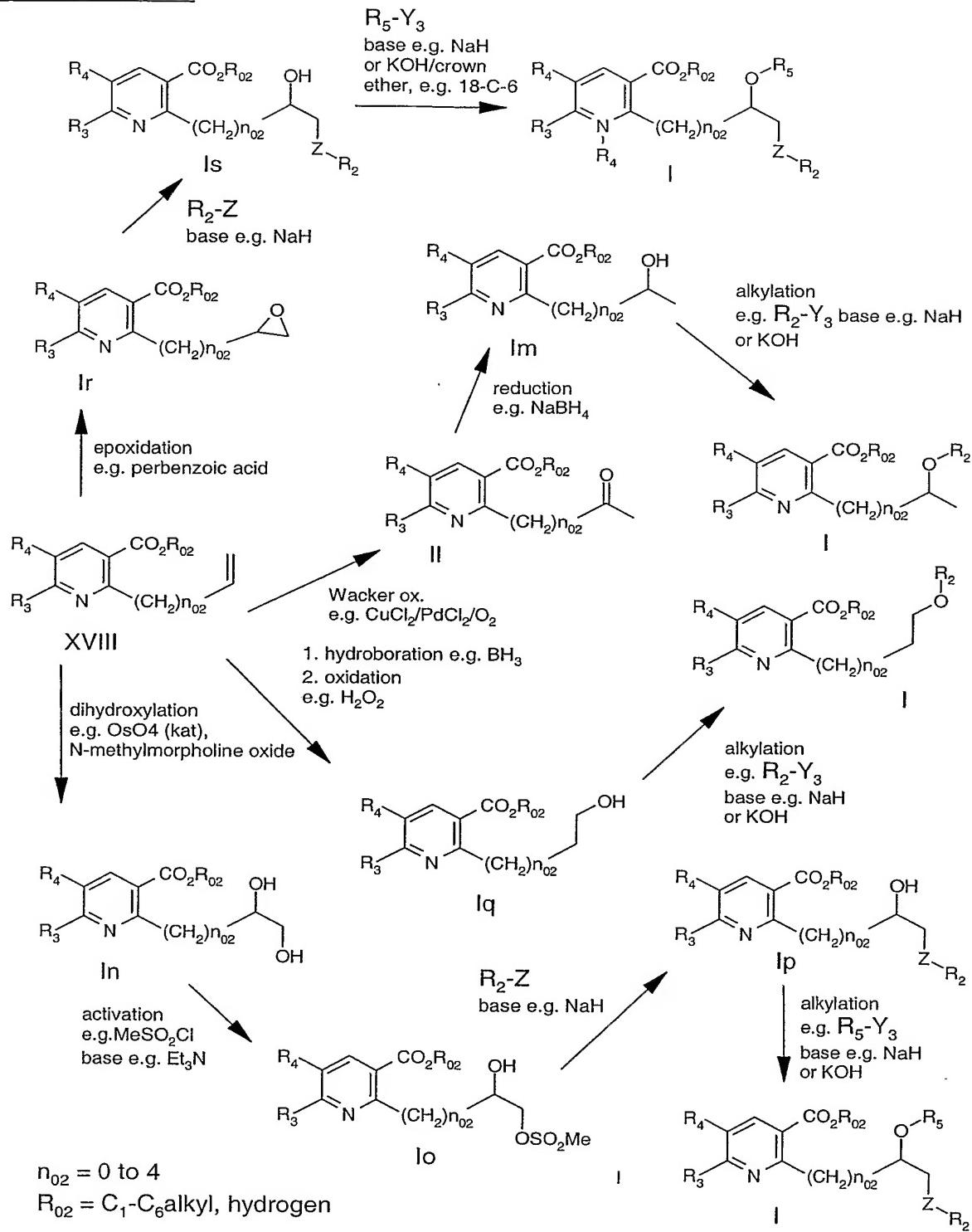
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Reaction scheme 5



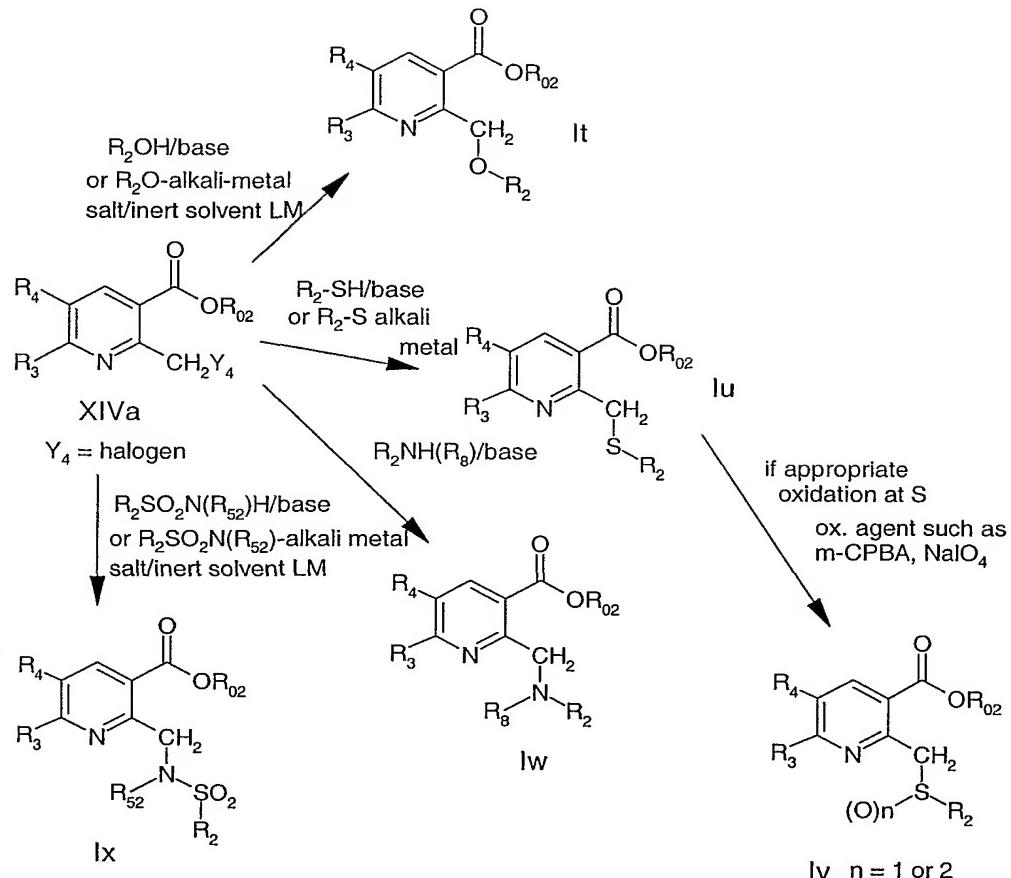
Intermediates of the formula Ib, in which R_1 , R_2 , R_3 , R_4 and X_1 are as defined under formula I, can also be prepared by the method according to reaction scheme 6:

Reaction scheme 6



Using generally known oxidation methods such as dihydroxylation, Wacker oxidation, epoxidation, hydroboration with subsequent oxidation, starting with vinyl or allyl compounds of the formula XVIII (preparation as described in WO 00/15615 or WO/0039094), intermediates of the formulae II, In, Iq and Ir are obtained which can be converted by conversion processes known to the person skilled in the art (for example alcohol activation, for example as sulfonate, alkylation, for example using an alkylating agent R₂-Y₃ or R₅-Y₃, in which R₂ and R₅ are as defined under formula I and Y₃ is a leaving group, for example halogen), in the presence of a base, or using nucleophile reactions, for example with a nucleophile Z-R₂, in which Z and R₂ are as defined above, into compounds of the formula I.

Intermediates of the formula Ib, in which R₁ is C₁-C₂alkyl and R₂, R₃, R₄ and X₁ are as defined under formula I, can also be prepared by reacting a compound of the formula XIVa, in which R₃ and R₄ are as defined above under formula I and Y₄ is halogen, with a nucleophile R₂-Z, in which Z is -SH, -OH, -C(O)OH, -O-N(R₅₁)H, -N(R₆)-OH -SO₂N(R₅₂)H or -N(R₈)H and R₂, R₅₂, R₈, R₆, R₅₁ are as defined above under formula I, in the presence of a base such as sodium hydride or an alkaline earth metal oxide or carbonate in an inert solvent such as dimethylformamide or THF at temperatures between -5 and 160°C, or, to prepare the corresponding sulfinyl or sulfonyl derivatives of the formula Iu, by reacting with an oxidizing agent such as m-chloroperbenzoic acid or sodium periodate, or sodium perborate, with, depending on the degree of oxidation, temperature control known to the person skilled in the art (for example -30°C-+50°C for n=1 and -20°C-+100°C for n=2 respectively) , in an inert solvent such as dichloromethane, to give compound of the formula Iv. In reaction scheme 7 below, this is illustrated in more detail for the case Z = OH, SH, SO₂N(R₅₂)H and N(R₈)H:

Reaction scheme 7

Intermediates of the formula I, in which Q denotes a group OR_{02} ($\text{R}_{02} = \text{C}_1\text{-C}_6\text{alkyl}$), can be converted by hydrolysis using, for example, a base, for example LiOH , in a protic solvent, for example H_2O or $\text{H}_2\text{O}/\text{methanol}$ mixtures, into products of the formula Ib.

For preparing all further compounds of the formula I functionalized according to the definitions of R_1 , R_2 , R_3 , R_4 and X_1 , there are a large number of suitable known standard methods, for example alkylation, halogenation, acylation, amidation, oximation, oxidation and reduction, the choice of the preparation methods which are suitable depending on the properties (reactivity) of the substituents in the intermediates.

The reactions to give compounds of the formula I are advantageously carried out in aprotic inert organic solvents. Such solvents are hydrocarbons such as benzene, toluene, xylene or cyclohexane, chlorinated hydrocarbons such as dichloromethane, trichloromethane, tetrachloromethane or chlorobenzene, ethers such as diethyl ether, ethylene glycol dimethyl

ether, diethylene glycol dimethyl ether, tetrahydrofuran or dioxane, nitriles such as acetonitrile or propionitrile, amides such as N,N-dimethylformamide, diethylformamide or N-methylpyrrolidinone. The reaction temperatures are advantageously between -20°C and +120°C. In general, the reactions are slightly exothermic and, as a rule, they can be carried out at room temperature. To shorten the reaction time, or else to start the reaction, the mixture may be heated briefly to the boiling point of the reaction mixture. The reaction times can also be shortened by adding a few drops of base as reaction catalyst. Suitable bases are, in particular, tertiary amines such as trimethylamine, triethylamine, quinuclidine, 1,4-diazabicyclo[2.2.2]octane, 1,5-diazabicyclo[4.3.0]non-5-ene or 1,5-diazabicyclo[5.4.0]undec-7-ene. However, inorganic bases such as hydrides, e.g. sodium hydride or calcium hydride, hydroxides, e.g. sodium hydroxide or potassium hydroxide, carbonates such as sodium carbonate and potassium carbonate, or hydrogen carbonates such as potassium hydrogen carbonate and sodium hydrogen carbonate may also be used as bases. The bases can be used as such or else with catalytic amounts of a phase-transfer catalyst, for example a crown ether, in particular 18-crown-6, or a tetraalkylammonium salt.

The compounds of the formula I can be isolated in the customary manner by concentrating and/or by evaporating the solvent and purified by recrystallization or trituration of the solid residue in solvents in which they are not readily soluble, such as ethers, aromatic hydrocarbons or chlorinated hydrocarbons.

All application methods which are conventionally used in agriculture, for example pre-emergence application, post-emergence application and seed treatment, as well as various methods and techniques, for example the controlled release of active ingredients, are suitable for the use according to the invention of the compounds of the formula I or of compositions comprising them. To this end, the active ingredient in solution is applied to mineral carriers for granules or to polymerized granules (urea/formaldehyde) and dried. If appropriate, an additional coating can be applied (coated granules), which allows the active ingredient to be released in a controlled manner over a specific period of time.

The compounds of the formula I can be employed as herbicides as such, i.e. as obtained from synthesis. However, they are preferably processed in the customary manner together with the auxiliaries conventionally used in the art of formulation, for example to give emulsifiable concentrates, directly sprayable or dilutable solutions, dilute emulsions, wettable powders, soluble powders, dusts, granules or microcapsules. Such formulations are described, for example, in WO 97/34485 on pages 9 to 13. The application methods such as

spraying, atomizing, dusting, wetting, scattering or pouring, as well as the type of composition, are chosen to suit the intended aims and the prevailing circumstances.

The formulations, i.e. the compositions, preparations or products which comprise the active ingredient of the formula I or at least one active ingredient of the formula I and, as a rule, one or more solid or liquid formulation auxiliaries, are prepared in the known manner, for example by intimately mixing and/or grinding the active ingredients together with the formulation auxiliaries, for example solvents or solid carriers. Furthermore, surface-active compounds (surfactants) may additionally be used when preparing the formulations.

Examples of solvents and solid carriers are indicated for example in WO 97/34485 on page 6.

Suitable surface-active compounds are, depending on the nature of the active ingredient of the formula I to be formulated, nonionic, cationic and/or anionic surfactants and surfactant mixtures which have good emulsifying, dispersing and wetting properties. Examples of suitable anionic, nonionic and cationic surfactants are enumerated, for example, in WO 97/34485 on pages 7 and 8. The surfactants conventionally used in the art of formulation which are described, inter alia, in "McCutcheon's Detergents and Emulsifiers Annual" MC Publishing Corp., Ridgewood New Jersey, 1981, Stache, H., "Tensid-Taschenbuch" ["Surfactants Guide"], Carl Hanser Verlag, Munich/Vienna, 1981 and M. and J. Ash, "Encyclopedia of Surfactants", Vol I-III, Chemical Publishing Co., New York, 1980-81 are furthermore also suitable for preparing the herbicidal compositions according to the invention.

As a rule, the herbicidal formulations comprise 0.1 to 99% by weight, in particular 0.1 to 95% by weight, of herbicide, 1 to 99.9% by weight, in particular 5 to 99.8% by weight, of a solid or liquid formulation auxiliary and 0 to 25% by weight, in particular 0.1 to 25% by weight, of a surfactant. While concentrated compositions are more preferred as commercially available goods, the end consumer uses, as a rule, dilute compositions. The compositions can also comprise further additives such as stabilizers, for example epoxidized or non-epoxidized vegetable oils (epoxidized coconut oil, rapeseed oil or soya oil), antifoams, e.g. silicone oil, preservatives, viscosity regulators, binders, tackifiers and fertilizers or other active ingredients.

As a rule, the active ingredients of the formula I are applied to the plant or its environment at rates of 0.001 to 4 kg/ha, in particular 0.005 to 2 kg/ha. The dosage required for the desired

action can be determined by experiments. It depends on the type of the action, the developmental stage of the crop plant and of the weed, and on the application (location, timing, method) and can, owing to these parameters, vary within wide limits.

The compounds of the formula I are distinguished by herbicidal and growth-inhibitory properties which allow them to be employed in crops of useful plants, in particular in cereals, cotton, soya, sugar beet, sugar cane, plantation crops, rapeseed, maize and rice and for the non-selective control of weeds. Crops are also to be understood as including those which have been rendered tolerant to herbicides or classes of herbicides by means of conventional plant-breeding or genetic-engineering methods. The weeds to be controlled may be both mono- and dicotyledonous weeds such as *Stellaria*, *Nasturtium*, *Agrostis*, *Digitaria*, *Avena*, *Setaria*, *Sinapis*, *Lolium*, *Solanum*, *Echinochloa*, *Scirpus*, *Monochoria*, *Sagittaria*, *Bromus*, *Alopecurus*, *Sorghum halepense*, *Rottboellia*, *Cyperus*, *Abutilon*, *Sida*, *Xanthium*, *Amaranthus*, *Chenopodium*, *Ipomoea*, *Chrysanthemum*, *Galium*, *Viola* and *Veronica*.

The examples which follow illustrate the invention in greater detail without limiting it.

Preparation examples:

Example H1: Preparation of ethyl 2-bromomethyl-6-trifluoromethylnicotinate:

434.4 g (1.866 mol) of ethyl 2-methyl-6-trifluoromethylnicotinate (preparation similar to *Heterocycles* 129, 46, 1997) and 398.5 g (2.239 mol) of N-bromosuccinimide in 3 500 ml of carbon tetrachloride in the presence of 30.6 g (0.1866 mol) of α,α -azaisobutyronitrile are heated at 75°C, with irradiation from a 150 Watt lamp. After 3 hours, the reaction is terminated, the mixture is cooled to 15°C and precipitated succinimide is removed by filtration. After evaporation of the solvent, the residue is distilled under reduced pressure. This gives ethyl 2-bromomethyl-6-trifluoromethylnicotinate as an oily product (260.2 g, 44.7% of theory, b.p. 74°C/0.04 mmHg).

Example H2: 2-(2-Methoxyethoxymethyl)-6-trifluoromethylnicotinic acid:

At room temperature, 177.2 g of ethyl 2-bromomethyl-6-trifluoromethylnicotinate are dissolved in 3 000 ml of toluene and reacted with 398 ml (1.704 mol) of a 21% ethanolic solution of sodium ethoxide. After 8 hours at room temperature, 1500 ml of ethanol and 100 ml of 30% aqueous sodium hydroxide solution are added with vigorous stirring, and the

reaction mixture is stirred at this temperature for another 4 hours. The reaction mixture is poured into water and extracted with ethyl acetate, and the aqueous phase is acidified to pH 1. Following extraction with ethyl acetate, drying over sodium sulfate, evaporation under reduced pressure and trituration with hexane, pure 2-(2-methoxyethoxymethyl)-6-trifluoromethylnicotinic acid is obtained in the form of white crystals of melting point 62-63°C.

Example H3: 4-Hydroxy-3-[2-(2-methoxyethoxymethyl)-6-trifluoromethylpyridine-3-carbonyl]bicyclo[3.2.1]oct-3-en-2-one:

24.9 g (0.1 mol) of 2-(2-methoxyethoxymethyl)-6-trifluoromethylnicotinic acid are dissolved in 200 ml of methylene chloride and 20 ml of oxalyl chloride, and 0.1 ml of dimethylformamide is then added dropwise. After the strong evolution of gas has ceased, triethylamine (27.9 ml, 0.2 mol), dimethylaminopyridine (1.22 g, 0.01 mol) and 15.2 g (0.11 mol) of bicyclo[3.2.1]octane-2,4-dione are added at a temperature of from 0 to 5°C. After 3 hours at 22°C, the reaction mixture is extracted with 2 N hydrochloric acid. The methylenechloride phase is separated off, washed with water and then extracted with 10% aqueous sodium bicarbonate solution, dried over sodium sulfate and concentrated. This gives 36.9 g (100% of theory) of 4-oxobicyclo[3.2.1]oct-2-en-2-yl 2-(2-methoxyethoxymethyl)-6-trifluoromethyl-nicotinate as an oil, which can be used further without purification.

36.9 g (0.1 mol) of 4-oxobicyclo[3.2.1]oct-2-en-2-yl 2-(2-methoxyethoxymethyl)-6-trifluoromethylnicotinate and 27.9 ml (0.2 mol) of triethylamine are dissolved in 400 ml of acetonitrile. At a temperature of 22°C, 0.92 ml (0.01 mol) of acetone cyanohydrin is added. After 18 hours at 22°C, the reaction mixture is poured into a water/2 N hydrochloric acid mixture and extracted with ethyl acetate. The ethyl acetate phase is washed with water and then with concentrated sodium chloride solution, dried over sodium sulfate and concentrated, and the residue is triturated with hexane. Filtration gives 27.9 g (75.6% of theory) of 4-hydroxy-3-[2-(2-methoxyethoxymethyl)-6-trifluoromethylpyridine-3-carbonyl]bicyclo[3.2.1]oct-3-en-2-one in the form of white crystals (m.p. 55-56°C).

Example H4: 3-(2-Hydroxy-4-oxobicyclo[3.2.1]oct-2-en-3-carbonyl)-6-trifluoromethylpyridin-2-yl methyl acetate:

5.0 g (1 mmol) of 4-hydroxy-3-(2-methyl-1-oxy-6-trifluoromethylpyridin-3-carbonyl)-bicyclo[3.2.1]oct-3-en-2-one (preparation as described in WO 00/15615) are dissolved in 100 ml of toluene and, in the presence of 6.9 ml (0.073 mol) of acetic anhydride, heated at reflux temperature for 10 hours. The mixture is then partitioned between water and ethyl acetate and the organic phase is dried over sodium sulfate and concentrated under reduced pressure. The residue that remains is chromatographed on silica gel. The viscous oil obtained by eluting with a mixture of toluene, ethyl alcohol, dioxane, triethylamine and water (100:40:20:20:5 parts by volume) is dissolved in ethyl acetate and washed successively with 10% hydrochloric acid and water. The organic solution is dried over Na_2SO_4 and concentrated, giving 2.14 g (38%) of pure 3-(2-hydroxy-4-oxobicyclo[3.2.1]oct-2-ene-3-carbonyl)-6-trifluoromethylpyridin-2-ylmethyl acetate in the form of an oil. **$^1\text{H-NMR}$** (250 MHz, CDCl_3): 17.06 (s), 1H; 7.67 (s), 2H; 5.27 (d, $J = 12.5$ Hz), 1H; 5.20 (d, $J = 12.5$ Hz), 1H; 3.18, (t, $J = 5.0$ Hz), 1H; 2.92, (t, $J = 5.0$ Hz), 1H; 2.29-1.98 (m), 4H; 2.00, (s), 3H; 1.81-1.73 ppm (m), 2H.

Example H5: 4-Hydroxy-3-(2-oxiranylmethoxymethyl-6-trifluoromethylpyridine-3-carbonyl)-bicyclo[3.2.1]oct-3-en-2-one:

5 g (0.013 mol) of 3-(2-hydroxy-4-oxobicyclo[3.2.1]oct-2-ene-3-carbonyl)-6-trifluoromethylpyridin-2-ylmethyl acetate are dissolved in 60 ml of methanol/water (3:1 mixture), and 1.4 g (0.046 mol) of lithium hydroxide hydrate are added a little at a time at a temperature of 22°C. After 3 hours at 22°C, the reaction mixture is poured into ethyl acetate and 10% hydrochloric acid, and the organic phase is washed three times with water, dried with sodium sulfate and concentrated. This gives 4.1g of 4-hydroxy-3-(2-hydroxymethyl-6-trifluoromethylpyridine-3-carbonyl)bicyclo[3.2.1]oct-3-en-2-one as an oil which can be reacted further without purification.

1.5 g of 4-hydroxy-3-(2-hydroxymethyl-6-trifluoromethylpyridine-3-carbonyl)-bicyclo[3.2.1]oct-3-en-2-one are dissolved in 15 ml of dimethylformamide and, at room temperature, treated with 0.4 g of sodium hydride (80% suspension in oil, 0.013 mol), a little at a time. After 15 minutes at a temperature of 22°C, 3ml (0.036 mol) of epibromohydrin are added dropwise,

and the reaction mixture is stirred at this temperature for another 18 hours. Ethyl acetate is then added, and the mixture is acidified to pH 3 using 10% hydrochloric acid and extracted with ethyl acetate. The organic phase is dried over sodium sulfate and the crude product is purified chromatographically (mobile phase: toluene/ethyl alcohol/dioxane/triethylamine/water 100:40:20:20:5 parts by volume). This gives the title compound (triethylamine salt) in the form of a yellowish resin, which is released similarly to example H4. Trituration with hexane gives 600 mg of pure 4-hydroxy-3-(2-oxiranylmethoxy-methyl-6-trifluoromethylpyridin-3-carbonyl)bicyclo[3.2.1]oct-3-en-2-one of melting point 54-56°C.

Example H6: (5-Hydroxy-1,3-dimethyl-1H-pyrazol-4-yl)-[2-(2-methoxyethoxymethyl)-6-trifluoromethylpyridin-3-yl]methanone:

1.0 g (0.004 mol) of 2-(2-methoxyethoxymethyl)-6-trifluoromethylnicotinic acid is dissolved in 10 ml of oxalyl chloride. Three drops of dimethylformamide are added, and the mixture is stirred at room temperature for 1 hour. The mixture is then concentrated using a rotary evaporator, and the residue (2-(2-methoxyethoxymethyl)-6-trifluoromethylnicotinoyl chloride) is taken up in 10 ml of methylene chloride. At a temperature of 0°C, 0.84 ml (0.006 mol) of triethylamine and 0.45 g (0.004 mol) of 2,5-dimethyl-2,4-dihydropyrazol-3-one are added. After 2 hours at a temperature of 22°C, the solvent is removed using a vacuum rotary evaporator, and the residue that remains is dissolved in 10 ml of acetonitrile and, to rearrange the intermediate (2,5-dimethyl-2H-pyrazol-3-yl 2-(2-methoxyethoxymethyl)-6-trifluoromethylnicotinate), admixed with 0.1 ml of acetone cyanohydrin and 1.13 ml (0.008 mol) of triethylamine. The reaction solution is stirred at room temperature for four hours and then concentrated. The syrup that remains is chromatographed on silica gel. The viscous oil obtained by eluting with a mixture of toluene, ethyl alcohol, dioxane, triethylamine and water (100:40:20:20:5 parts by volume) is dissolved in ethyl acetate and washed successively with 10% hydrochloric acid and water. The organic solution is dried over Na₂SO₄ and concentrated, giving 0.93 g of (5-hydroxy-1,3-dimethyl-1H-pyrazol-4-yl)-[2-(2-methoxyethoxymethyl)-6-trifluoromethylpyridin-3-yl]methanone in the form of a viscous oil.
¹H NMR (300 MHz, CDCl₃, δ in ppm): 7.81, (d, J = 6 Hz), 1H; 7.74, (d, J = 6 Hz), 1H; 4.84, (s), 2H; 2H: 3.71, (s), 3H; 3.59, (t, J = 6 Hz) 2H; 3.38, (dd, J 4.0, 3.0 Hz), 1H; 3.26, (s), 3H; 1.82 ppm, (s), 1H.

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Preferred compounds of the formula I and their intermediates are listed in the tables below.

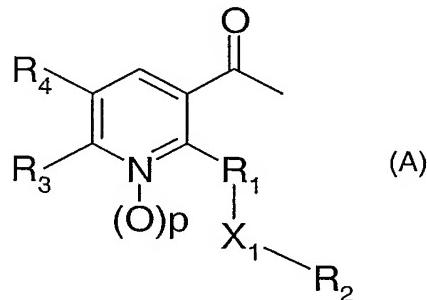
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no free valency is indicated in the substituent R₂, as, for example, in the case of  , the point of attachment is at the "CH" carbon atom.

In the table below, the compounds of the formula I are represented as:

A-Q

where the formula A



denotes the following radicals:

| Radical | R ₁ | R ₂ | R ₄ | R ₃ | X ₁ | p |
|---------|-----------------|--|----------------|-----------------|-----------------|---|
| A1 | CH ₂ | CH ₃ | H | CF ₃ | O | 0 |
| A2 | CH ₂ | CH ₂ CH ₃ | H | CF ₃ | O | 0 |
| A3 | CH ₂ | (CH ₃) ₂ CH | H | CF ₃ | O | 0 |
| A4 | CH ₂ | PhCH ₂ | H | CF ₃ | O | 0 |
| A5 | CH ₂ | CH ₃ | H | CF ₃ | S | 0 |
| A6 | CH ₂ | CH ₃ | H | CF ₃ | SO | 0 |
| A7 | CH ₂ | CH ₃ | H | CF ₃ | SO ₂ | 0 |
| A8 | CH ₂ | CH ₃ OCH ₂ | H | CF ₃ | O | 0 |
| A9 | CH ₂ | CH ₃ CH ₂ OCH ₂ | H | CF ₃ | O | 0 |
| A10 | CH ₂ | CH ₃ OCH ₂ CH ₂ | H | CF ₃ | O | 0 |

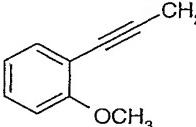
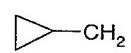
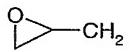
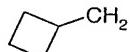
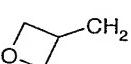
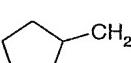
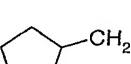
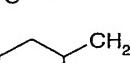
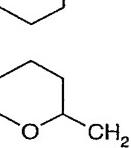
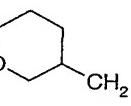
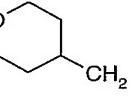
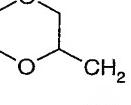
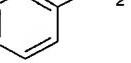
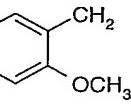
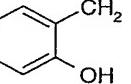
| Radical | R ₁ | R ₂ | R ₄ | R ₃ | X ₁ | p |
|---------|-----------------|---|----------------|-----------------|----------------|---|
| A11 | CH ₂ | CH ₃ CH ₂ OCH ₂ CH ₂ | H | CF ₃ | O | 0 |
| A12 | CH ₂ | CH ₃ OC(CH ₃) ₂ CH ₂ | H | CF ₃ | O | 0 |
| A13 | CH ₂ | CH ₃ OCH(CH ₃)CH ₂ | H | CF ₃ | O | 0 |
| A14 | CH ₂ | CH ₃ OCH ₂ CH(CH ₃) | H | CF ₃ | O | 0 |
| A15 | CH ₂ | CH ₃ OCH ₂ C(CH ₃) ₂ | H | CF ₃ | O | 0 |
| A16 | CH ₂ | CH ₃ OCH(CH ₃) | H | CF ₃ | O | 0 |
| A17 | CH ₂ | CH ₃ OC(CH ₃) ₂ | H | CF ₃ | O | 0 |
| A18 | CH ₂ | HC≡CCH ₂ | H | CF ₃ | O | 0 |
| A19 | CH ₂ | H ₂ C=CHCH ₂ | H | CF ₃ | O | 0 |
| A20 | CH ₂ | CH ₃ C≡CCH ₂ | H | CF ₃ | O | 0 |
| A21 | CH ₂ |  | H | CF ₃ | O | 0 |
| A22 | CH ₂ |  | H | CF ₃ | O | 0 |
| A23 | CH ₂ |  | H | CF ₃ | O | 0 |
| A24 | CH ₂ |  | H | CF ₃ | O | 0 |
| A25 | CH ₂ |  | H | CF ₃ | O | 0 |
| A26 | CH ₂ |  | H | CF ₃ | O | 0 |
| A27 | CH ₂ |  | H | CF ₃ | O | 0 |
| A28 | CH ₂ |  | H | CF ₃ | O | 0 |
| A29 | CH ₂ |  | H | CF ₃ | O | 0 |
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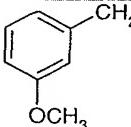
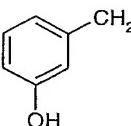
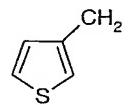
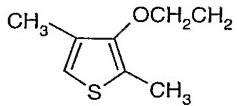
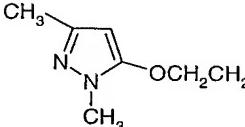
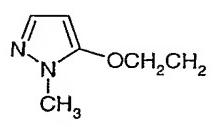
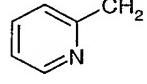
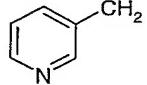
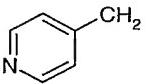
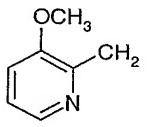
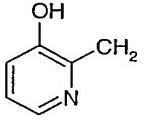
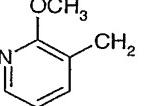
| Radical | R ₁ | R ₂ | R ₄ | R ₃ | X ₁ | p |
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| A33 | CH ₂ | | H | CF ₃ | O | 0 |
| A34 | CH ₂ | | H | CF ₃ | O | 0 |
| A35 | CH ₂ | | H | CF ₃ | O | 0 |
| A36 | CH ₂ | | H | CF ₃ | O | 0 |
| A37 | CH ₂ | | H | CF ₃ | O | 0 |
| A38 | CH ₂ | | H | CF ₃ | O | 0 |
| A39 | CH ₂ | | H | CF ₃ | O | 0 |
| A40 | CH ₂ | | H | CF ₃ | O | 0 |
| A41 | CH ₂ | | H | CF ₃ | O | 0 |
| A42 | CH ₂ | | H | CF ₃ | O | 0 |
| A43 | CH ₂ | | H | CF ₃ | O | 0 |

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| Radical | R₁ | R₂ | R₄ | R₃ | X₁ | p |
|----------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------|
| A44 | CH ₂ | | H | CF ₃ | O | 0 |
| A45 | CH ₂ | | H | CF ₃ | O | 0 |
| A46 | CH ₂ | | H | CF ₃ | O | 0 |
| A47 | CH ₂ | | H | CF ₃ | O | 0 |
| A48 | CH ₂ | | H | CF ₃ | O | 0 |
| A49 | CH ₂ | | H | CF ₃ | O | 0 |
| A50 | CH ₂ | | H | CF ₃ | O | 0 |
| A51 | CH ₂ | | H | CF ₃ | O | 0 |
| A52 | CH ₂ | | H | CF ₃ | O | 0 |
| A53 | CH ₂ | | H | CF ₃ | O | 0 |
| A54 | CH ₂ | | H | CF ₃ | O | 0 |

| Radical | R ₁ | R ₂ | R ₄ | R ₃ | X ₁ | p |
|---------|-----------------|---|----------------|-----------------|----------------|---|
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| A56 | CH ₂ |  | H | CF ₃ | O | 0 |
| A57 | CH ₂ |  | H | CF ₃ | O | 0 |
| A58 | CH ₂ |  | H | CF ₃ | O | 0 |
| A59 | CH ₂ |  | H | CF ₃ | O | 0 |
| A60 | CH ₂ |  | H | CF ₃ | O | 0 |
| A61 | CH ₂ |  | H | CF ₃ | O | 0 |
| A62 | CH ₂ |  | H | CF ₃ | O | 0 |
| A63 | CH ₂ |  | H | CF ₃ | O | 0 |
| A64 | CH ₂ |  | H | CF ₃ | O | 0 |
| A65 | CH ₂ |  | H | CF ₃ | O | 0 |
| A66 | CH ₂ |  | H | CF ₃ | O | 0 |
| A67 | CH ₂ |  | H | CF ₃ | O | 0 |
| A68 | CH ₂ |  | H | CF ₃ | O | 0 |
| A69 | CH ₂ |  | H | CF ₃ | O | 0 |

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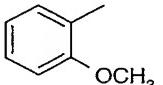
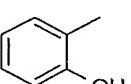
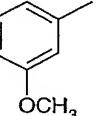
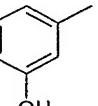
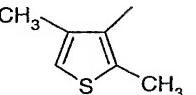
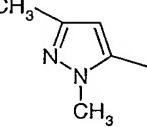
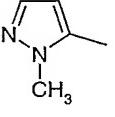
| Radical | R₁ | R₂ | R₄ | R₃ | X₁ | p |
|----------------|----------------------|---|----------------------|----------------------|----------------------|----------|
| A70 | CH ₂ |  | H | CF ₃ | O | 0 |
| A71 | CH ₂ |  | H | CF ₃ | O | 0 |
| A72 | CH ₂ |  | H | CF ₃ | O | 0 |
| A73 | CH ₂ |  | H | CF ₃ | O | 0 |
| A74 | CH ₂ |  | H | CF ₃ | O | 0 |
| A75 | CH ₂ |  | H | CF ₃ | O | 0 |
| A76 | CH ₂ |  | H | CF ₃ | O | 0 |
| A77 | CH ₂ |  | H | CF ₃ | O | 0 |
| A78 | CH ₂ |  | H | CF ₃ | O | 0 |
| A79 | CH ₂ |  | H | CF ₃ | O | 0 |
| A80 | CH ₂ |  | H | CF ₃ | O | 0 |
| A81 | CH ₂ |  | H | CF ₃ | O | 0 |

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| Radical | R ₁ | R ₂ | R ₄ | R ₃ | X ₁ | p |
|---------|---------------------------------|---|----------------|-----------------|-----------------|---|
| A82 | CH ₂ | | H | CF ₃ | O | 0 |
| A83 | CH ₂ | | H | CF ₃ | O | 0 |
| A84 | CH ₂ | | H | CF ₃ | O | 0 |
| A85 | CH ₂ | | H | CF ₃ | O | 0 |
| A86 | CH ₂ | | H | CF ₃ | O | 0 |
| A87 | CH ₂ | | H | CF ₃ | O | 0 |
| A88 | CH ₂ | | H | CF ₃ | O | 0 |
| A89 | CH ₂ | | H | CF ₃ | O | 0 |
| A90 | CH ₂ | | H | CF ₃ | O | 0 |
| A91 | CH ₂ CH ₂ | CH ₃ | H | CF ₃ | O | 0 |
| A92 | CH ₂ CH ₂ | CH ₃ CH ₂ | H | CF ₃ | O | 0 |
| A93 | CH ₂ CH ₂ | (CH ₃) ₂ CH | H | CF ₃ | O | 0 |
| A94 | CH ₂ CH ₂ | PhCH ₂ | H | CF ₃ | O | 0 |
| A95 | CH ₂ CH ₂ | CH ₃ | H | CF ₃ | S | 0 |
| A96 | CH ₂ CH ₂ | CH ₃ | H | CF ₃ | SO | 0 |
| A97 | CH ₂ CH ₂ | CH ₃ | H | CF ₃ | SO ₂ | 0 |
| A98 | CH ₂ CH ₂ | (CH ₃) ₂ CHCH ₂ | H | CF ₃ | O | 0 |

| Radical | R ₁ | R ₂ | R ₄ | R ₃ | X ₁ | p |
|---------|---------------------------------|---|----------------|-----------------|----------------|---|
| A99 | CH ₂ CH ₂ | CH ₃ OCH ₂ | H | CF ₃ | O | 0 |
| A100 | CH ₂ CH ₂ | CH ₃ CH ₂ OCH ₂ | H | CF ₃ | O | 0 |
| A101 | CH ₂ CH ₂ | CH ₃ OCH ₂ CH ₂ | H | CF ₃ | O | 0 |
| A102 | CH ₂ CH ₂ | CH ₃ CH ₂ OCH ₂ CH ₂ | H | CF ₃ | O | 0 |
| A103 | CH ₂ CH ₂ | CH ₃ OC(CH ₃) ₂ CH ₂ | H | CF ₃ | O | 0 |
| A104 | CH ₂ CH ₂ | CH ₃ OCH(CH ₃)CH ₂ | H | CF ₃ | O | 0 |
| A105 | CH ₂ CH ₂ | CH ₃ OCH ₂ CH(CH ₃) | H | CF ₃ | O | 0 |
| A106 | CH ₂ CH ₂ | CH ₃ OCH ₂ C(CH ₃) ₂ | H | CF ₃ | O | 0 |
| A107 | CH ₂ CH ₂ | CH ₃ OCH(CH ₃) | H | CF ₃ | O | 0 |
| A108 | CH ₂ CH ₂ | CH ₃ OC(CH ₃) ₂ | H | CF ₃ | O | 0 |
| A109 | CH ₂ CH ₂ | HC≡CCH ₂ | H | CF ₃ | O | 0 |
| A110 | CH ₂ CH ₂ | H ₂ C=CHCH ₂ | H | CF ₃ | O | 0 |
| A111 | CH ₂ CH ₂ | CH ₃ C≡CCH ₂ | H | CF ₃ | O | 0 |
| A112 | CH ₂ CH ₂ | | H | CF ₃ | O | 0 |
| A113 | CH ₂ CH ₂ | | H | CF ₃ | O | 0 |
| A114 | CH ₂ CH ₂ | | H | CF ₃ | O | 0 |
| A115 | CH ₂ CH ₂ | | H | CF ₃ | O | 0 |
| A116 | CH ₂ CH ₂ | | H | CF ₃ | O | 0 |
| A117 | CH ₂ CH ₂ | | H | CF ₃ | O | 0 |
| A118 | CH ₂ CH ₂ | | H | CF ₃ | O | 0 |
| A119 | CH ₂ CH ₂ | | H | CF ₃ | O | 0 |
| A120 | CH ₂ CH ₂ | | H | CF ₃ | O | 0 |
| A121 | CH ₂ CH ₂ | | H | CF ₃ | O | 0 |

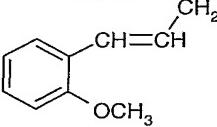
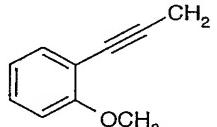
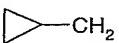
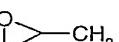
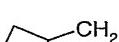
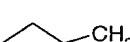
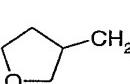
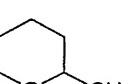
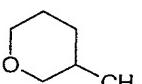
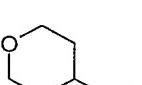
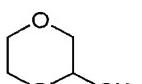
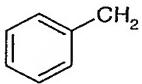
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| Radical | R₁ | R₂ | R₄ | R₃ | X₁ | p |
|----------------|---------------------------------|---|----------------------|----------------------|----------------------|----------|
| A122 | CH ₂ CH ₂ |  | H | CF ₃ | O | 0 |
| A123 | CH ₂ CH ₂ |  | H | CF ₃ | O | 0 |
| A124 | CH ₂ CH ₂ |  | H | CF ₃ | O | 0 |
| A125 | CH ₂ CH ₂ |  | H | CF ₃ | O | 0 |
| A126 | CH ₂ CH ₂ |  | H | CF ₃ | O | 0 |
| A127 | CH ₂ CH ₂ |  | H | CF ₃ | O | 0 |
| A128 | CH ₂ CH ₂ |  | H | CF ₃ | O | 0 |
| A129 | CH ₂ CH ₂ |  | H | CF ₃ | O | 0 |
| A130 | CH ₂ CH ₂ |  | H | CF ₃ | O | 0 |
| A131 | CH ₂ CH ₂ |  | H | CF ₃ | O | 0 |
| A132 | CH ₂ CH ₂ |  | H | CF ₃ | O | 0 |
| A133 | CH ₂ CH ₂ |  | H | CF ₃ | O | 0 |

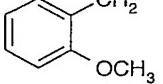
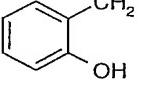
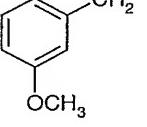
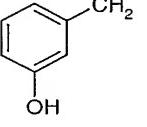
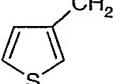
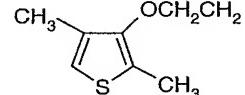
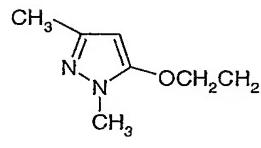
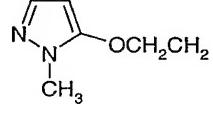
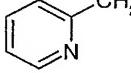
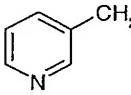
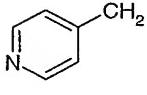
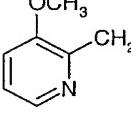
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| Radical | R ₁ | R ₂ | R ₄ | R ₃ | X ₁ | p |
|---------|---------------------------------|----------------|----------------|-----------------|----------------|---|
| A134 | CH ₂ CH ₂ | | H | CF ₃ | O | 0 |
| A135 | CH ₂ CH ₂ | | H | CF ₃ | O | 0 |
| A136 | CH ₂ CH ₂ | | H | CF ₃ | O | 0 |
| A137 | CH ₂ CH ₂ | | H | CF ₃ | O | 0 |
| A138 | CH ₂ CH ₂ | | H | CF ₃ | O | 0 |
| A139 | CH ₂ CH ₂ | | H | CF ₃ | O | 0 |
| A140 | CH ₂ CH ₂ | | H | CF ₃ | O | 0 |
| A141 | CH ₂ CH ₂ | | H | CF ₃ | O | 0 |
| A142 | CH ₂ CH ₂ | | H | CF ₃ | O | 0 |
| A143 | CH ₂ CH ₂ | | H | CF ₃ | O | 0 |
| A144 | CH ₂ CH ₂ | | H | CF ₃ | O | 0 |

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| Radical | R ₁ | R ₂ | R ₄ | R ₃ | X ₁ | p |
|---------|---------------------------------|---|----------------|-----------------|----------------|---|
| A145 | CH ₂ CH ₂ |  | H | CF ₃ | O | 0 |
| A146 | CH ₂ CH ₂ |  | H | CF ₃ | O | 0 |
| A147 | CH ₂ CH ₂ |  | H | CF ₃ | O | 0 |
| A148 | CH ₂ CH ₂ |  | H | CF ₃ | O | 0 |
| A149 | CH ₂ CH ₂ |  | H | CF ₃ | O | 0 |
| A150 | CH ₂ CH ₂ |  | H | CF ₃ | O | 0 |
| A151 | CH ₂ CH ₂ |  | H | CF ₃ | O | 0 |
| A152 | CH ₂ CH ₂ |  | H | CF ₃ | O | 0 |
| A153 | CH ₂ CH ₂ |  | H | CF ₃ | O | 0 |
| A154 | CH ₂ CH ₂ |  | H | CF ₃ | O | 0 |
| A155 | CH ₂ CH ₂ |  | H | CF ₃ | O | 0 |
| A156 | CH ₂ CH ₂ |  | H | CF ₃ | O | 0 |
| A157 | CH ₂ CH ₂ |  | H | CF ₃ | O | 0 |
| A158 | CH ₂ CH ₂ |  | H | CF ₃ | O | 0 |

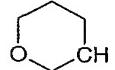
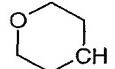
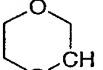
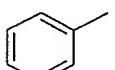
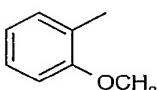
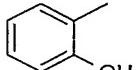
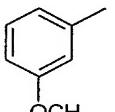
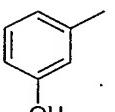
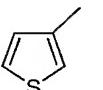
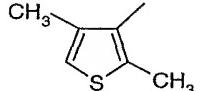
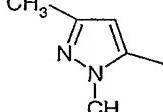
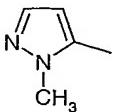
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| Radical | R₁ | R₂ | R₄ | R₃ | X₁ | p |
|----------------|---------------------------------|---|----------------------|----------------------|----------------------|----------|
| A159 | CH ₂ CH ₂ |  | H | CF ₃ | O | 0 |
| A160 | CH ₂ CH ₂ |  | H | CF ₃ | O | 0 |
| A161 | CH ₂ CH ₂ |  | H | CF ₃ | O | 0 |
| A162 | CH ₂ CH ₂ |  | H | CF ₃ | O | 0 |
| A163 | CH ₂ CH ₂ |  | H | CF ₃ | O | 0 |
| A164 | CH ₂ CH ₂ |  | H | CF ₃ | O | 0 |
| A165 | CH ₂ CH ₂ |  | H | CF ₃ | O | 0 |
| A166 | CH ₂ CH ₂ |  | H | CF ₃ | O | 0 |
| A167 | CH ₂ CH ₂ |  | H | CF ₃ | O | 0 |
| A168 | CH ₂ CH ₂ |  | H | CF ₃ | O | 0 |
| A169 | CH ₂ CH ₂ |  | H | CF ₃ | O | 0 |
| A170 | CH ₂ CH ₂ |  | H | CF ₃ | O | 0 |

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| Radical | R ₁ | R ₂ | R ₄ | R ₃ | X ₁ | p |
|---------|--------------------------------------|------------------------------------|----------------|-----------------|----------------|---|
| A171 | CH ₂ CH ₂ | | H | CF ₃ | O | 0 |
| A172 | CH ₂ CH ₂ | | H | CF ₃ | O | 0 |
| A173 | CH ₂ CH ₂ | | H | CF ₃ | O | 0 |
| A174 | CH ₂ CH ₂ | | H | CF ₃ | O | 0 |
| A175 | CH ₂ CH ₂ | | H | CF ₃ | O | 0 |
| A176 | CH ₂ CH ₂ | | H | CF ₃ | O | 0 |
| A177 | CH ₂ CH ₂ | | H | CF ₃ | O | 0 |
| A178 | CH ₂ CH ₂ | | H | CF ₃ | O | 0 |
| A179 | CH ₂ CH ₂ | | H | CF ₃ | O | 0 |
| A180 | CH ₂ CH ₂ | | H | CF ₃ | O | 0 |
| A181 | CH ₂ CH ₂ | | H | CF ₃ | O | 0 |
| A182 | CH(OCH ₃)CH ₂ | CH ₃ | H | CF ₃ | O | 0 |
| A183 | CH(OCH ₃)CH ₂ | CH ₃ CH ₂ | H | CF ₃ | O | 0 |
| A184 | CH(OCH ₃)CH ₂ | (CH ₃) ₂ CH | H | CF ₃ | O | 0 |

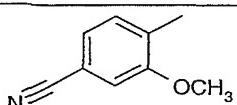
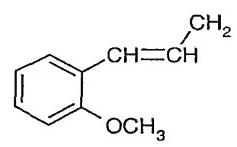
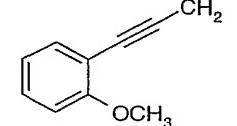
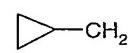
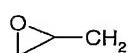
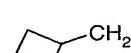
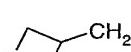
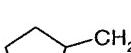
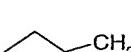
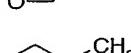
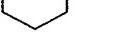
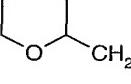
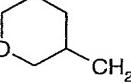
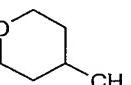
| Radical | R ₁ | R ₂ | R ₄ | R ₃ | X ₁ | p |
|---------|--------------------------------------|---|----------------|-----------------|-----------------|---|
| A185 | CH(OCH ₃)CH ₂ | PhCH ₂ | H | CF ₃ | O | 0 |
| A186 | CH(OCH ₃)CH ₂ | CH ₃ | H | CF ₃ | S | 0 |
| A187 | CH(OCH ₃)CH ₂ | CH ₃ | H | CF ₃ | SO | 0 |
| A188 | CH(OCH ₃)CH ₂ | CH ₃ | H | CF ₃ | SO ₂ | 0 |
| A189 | CH(OCH ₃)CH ₂ | CH ₃ CH ₂ CH ₂ | H | CF ₃ | O | 0 |
| A190 | CH(OCH ₃)CH ₂ | CH ₃ OCH ₂ | H | CF ₃ | O | 0 |
| A191 | CH(OCH ₃)CH ₂ | CH ₃ CH ₂ OCH ₂ | H | CF ₃ | O | 0 |
| A192 | CH(OCH ₃)CH ₂ | CH ₃ OCH ₂ CH ₂ | H | CF ₃ | O | 0 |
| A193 | CH(OCH ₃)CH ₂ | CH ₃ CH ₂ OCH ₂ CH ₂ | H | CF ₃ | O | 0 |
| A194 | CH(OCH ₃)CH ₂ | CH ₃ OC(CH ₃) ₂ CH ₂ | H | CF ₃ | O | 0 |
| A195 | CH(OCH ₃)CH ₂ | CH ₃ OCH(CH ₃)CH ₂ | H | CF ₃ | O | 0 |
| A196 | CH(OCH ₃)CH ₂ | CH ₃ OCH ₂ CH(CH ₃) | H | CF ₃ | O | 0 |
| A197 | CH(OCH ₃)CH ₂ | CH ₃ OCH ₂ C(CH ₃) ₂ | H | CF ₃ | O | 0 |
| A198 | CH(OCH ₃)CH ₂ | CH ₃ OCH(CH ₃) | H | CF ₃ | O | 0 |
| A199 | CH(OCH ₃)CH ₂ | CH ₃ OC(CH ₃) ₂ | H | CF ₃ | O | 0 |
| A200 | CH(OCH ₃)CH ₂ | HC≡CCH ₂ | H | CF ₃ | O | 0 |
| A201 | CH(OCH ₃)CH ₂ | H ₂ C=CHCH ₂ | H | CF ₃ | O | 0 |
| A202 | CH(OCH ₃)CH ₂ | CH ₃ C≡CCH ₂ | H | CF ₃ | O | 0 |
| A203 | CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |
| A204 | CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |
| A205 | CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |
| A206 | CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |
| A207 | CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |
| A208 | CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |
| A209 | CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |
| A210 | CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |

| Radical | R ₁ | R ₂ | R ₄ | R ₃ | X ₁ | p |
|---------|--------------------------------------|---|----------------|-----------------|----------------|---|
| A211 | CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A212 | CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A213 | CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A214 | CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A215 | CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A216 | CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A217 | CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A218 | CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A219 | CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A220 | CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A221 | CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A222 | CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |

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| Radical | R ₁ | R ₂ | R ₄ | R ₃ | X ₁ | p |
|---------|--------------------------------------|----------------|----------------|-----------------|----------------|---|
| A223 | CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |
| A224 | CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |
| A225 | CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |
| A226 | CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |
| A227 | CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |
| A228 | CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |
| A229 | CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |
| A230 | CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |
| A231 | CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |
| A232 | CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |
| A233 | CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |
| A234 | CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |

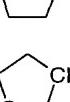
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| Radical | R ₁ | R ₂ | R ₄ | R ₃ | X ₁ | p |
|---------|--------------------------------------|---|----------------|-----------------|----------------|---|
| A235 | CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A236 | CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A237 | CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A238 | CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A239 | CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A240 | CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A241 | CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A242 | CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A243 | CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A244 | CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A245 | CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A246 | CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A247 | CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A248 | CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |

| Radical | R ₁ | R ₂ | R ₄ | R ₃ | X ₁ | p |
|---------|--------------------------------------|----------------|----------------|-----------------|----------------|---|
| A249 | CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |
| A250 | CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |
| A251 | CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |
| A252 | CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |
| A253 | CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |
| A254 | CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |
| A255 | CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |
| A256 | CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |
| A257 | CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |
| A258 | CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |
| A259 | CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |
| A260 | CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |

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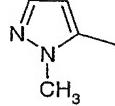
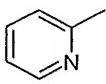
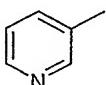
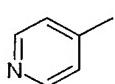
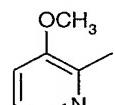
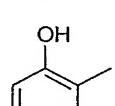
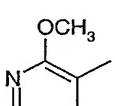
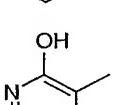
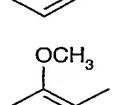
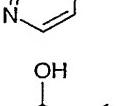
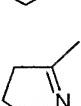
| Radical | R₁ | R₂ | R₄ | R₃ | X₁ | p |
|----------------|--------------------------------------|----------------------|----------------------|----------------------|----------------------|----------|
| A261 | CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |
| A262 | CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |
| A263 | CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |
| A264 | CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |
| A265 | CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |
| A266 | CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |
| A267 | CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |
| A268 | CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |
| A269 | CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |
| A270 | CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |
| A271 | CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |
| A272 | CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |

| Radical | R ₁ | R ₂ | R ₄ | R ₃ | X ₁ | p |
|---------|--|---|----------------|-----------------|-----------------|---|
| A273 | CH ₂ CH(OCH ₃)CH ₂ | CH ₃ | H | CF ₃ | O | 0 |
| A274 | CH ₂ CH(OCH ₃)CH ₂ | CH ₃ CH ₂ | H | CF ₃ | O | 0 |
| A275 | CH ₂ CH(OCH ₃)CH ₂ | (CH ₃) ₂ CH | H | CF ₃ | O | 0 |
| A276 | CH ₂ CH(OCH ₃)CH ₂ | PhCH ₂ | H | CF ₃ | O | 0 |
| A277 | CH ₂ CH(OCH ₃)CH ₂ | CH ₃ | H | CF ₃ | S | 0 |
| A278 | CH ₂ CH(OCH ₃)CH ₂ | CH ₃ | H | CF ₃ | SO | 0 |
| A279 | CH ₂ CH(OCH ₃)CH ₂ | CH ₃ | H | CF ₃ | SO ₂ | 0 |
| A280 | CH ₂ CH(OCH ₃)CH ₂ | CH ₃ CH ₂ CH ₂ | H | CF ₃ | O | 0 |
| A281 | CH ₂ CH(OCH ₃)CH ₂ | CH ₃ OCH ₂ | H | CF ₃ | O | 0 |
| A282 | CH ₂ CH(OCH ₃)CH ₂ | CH ₃ CH ₂ OCH ₂ | H | CF ₃ | O | 0 |
| A283 | CH ₂ CH(OCH ₃)CH ₂ | CH ₃ OCH ₂ CH ₂ | H | CF ₃ | O | 0 |
| A284 | CH ₂ CH(OCH ₃)CH ₂ | CH ₃ CH ₂ OCH ₂ CH ₂ | H | CF ₃ | O | 0 |
| A285 | CH ₂ CH(OCH ₃)CH ₂ | CH ₃ OC(CH ₃) ₂ CH ₂ | H | CF ₃ | O | 0 |
| A286 | CH ₂ CH(OCH ₃)CH ₂ | CH ₃ OCH(CH ₃)CH ₂ | H | CF ₃ | O | 0 |
| A287 | CH ₂ CH(OCH ₃)CH ₂ | CH ₃ OCH ₂ CH(CH ₃) | H | CF ₃ | O | 0 |
| A288 | CH ₂ CH(OCH ₃)CH ₂ | CH ₃ OCH ₂ C(CH ₃) ₂ | H | CF ₃ | O | 0 |
| A289 | CH ₂ CH(OCH ₃)CH ₂ | CH ₃ OCH(CH ₃) | H | CF ₃ | O | 0 |
| A290 | CH ₂ CH(OCH ₃)CH ₂ | CH ₃ OC(CH ₃) ₂ | H | CF ₃ | O | 0 |
| A291 | CH ₂ CH(OCH ₃)CH ₂ | HC≡CCH ₂ | H | CF ₃ | O | 0 |
| A292 | CH ₂ CH(OCH ₃)CH ₂ | H ₂ C=CHCH ₂ | H | CF ₃ | O | 0 |
| A293 | CH ₂ CH(OCH ₃)CH ₂ | CH ₃ C≡CCH ₂ | H | CF ₃ | O | 0 |
| A294 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A295 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A296 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A297 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A298 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A299 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |

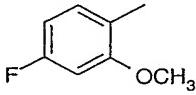
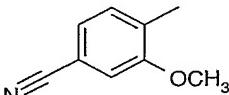
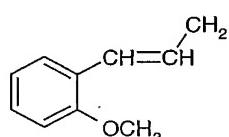
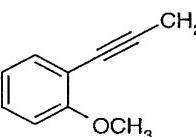
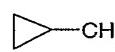
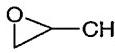
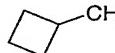
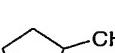
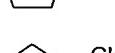
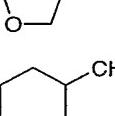
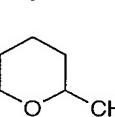
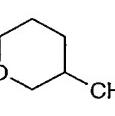
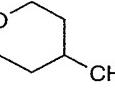
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| Radical | R₁ | R₂ | R₄ | R₃ | X₁ | p |
|----------------|--|----------------------|----------------------|----------------------|----------------------|----------|
| A300 | CH ₂ CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |
| A301 | CH ₂ CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |
| A302 | CH ₂ CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |
| A303 | CH ₂ CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |
| A304 | CH ₂ CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |
| A305 | CH ₂ CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |
| A306 | CH ₂ CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |
| A307 | CH ₂ CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |
| A308 | CH ₂ CH(OCH ₃)CH ₂ | | H | CF ₃ | O | p |
| A309 | CH ₂ CH(OCH ₃)CH ₂ | | H | CF ₃ | O | |
| A310 | CH ₂ CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |
| A311 | CH ₂ CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |
| A312 | CH ₂ CH(OCH ₃)CH ₂ | | H | CF ₃ | O | 0 |

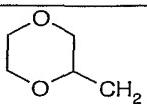
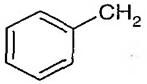
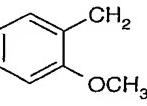
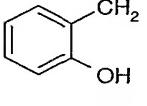
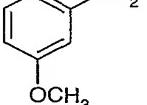
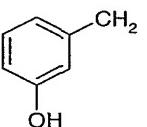
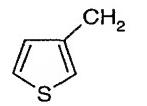
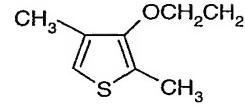
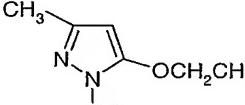
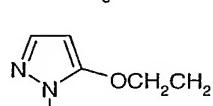
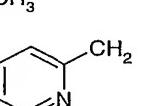
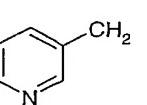
- 61 -

| Radical | R ₁ | R ₂ | R ₄ | R ₃ | X ₁ | p |
|---------|--|---|----------------|-----------------|----------------|---|
| A313 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A314 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A315 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A316 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A317 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A318 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A319 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A320 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A321 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A322 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A323 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A324 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |

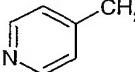
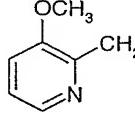
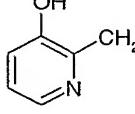
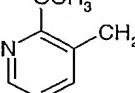
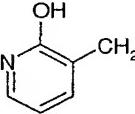
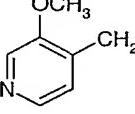
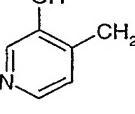
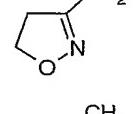
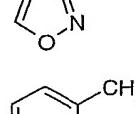
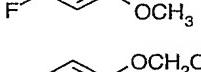
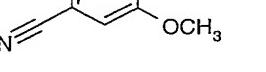
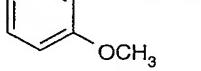
- 62 -

| Radical | R₁ | R₂ | R₄ | R₃ | X₁ | p |
|----------------|--|---|----------------------|----------------------|----------------------|----------|
| A325 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A326 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A327 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A328 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A329 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A330 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A331 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A332 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A333 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A334 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A335 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A336 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A337 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A338 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |

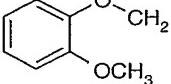
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| Radical | R ₁ | R ₂ | R ₄ | R ₃ | X ₁ | p |
|---------|--|---|----------------|-----------------|----------------|---|
| A339 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A340 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A341 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A342 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A343 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A344 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A345 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A346 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A347 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A348 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A349 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A350 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |

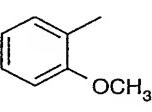
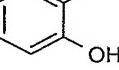
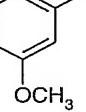
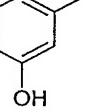
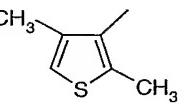
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| Radical | R ₁ | R ₂ | R ₄ | R ₃ | X ₁ | p |
|---------|--|---|----------------|-----------------|----------------|---|
| A351 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A352 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A353 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A354 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A355 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A356 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A357 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A358 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A359 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A360 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A361 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A362 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |

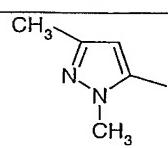
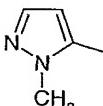
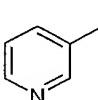
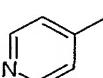
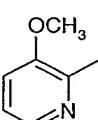
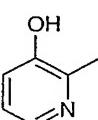
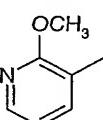
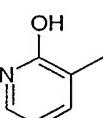
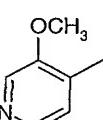
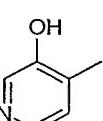
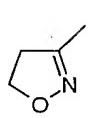
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| Radical | R ₁ | R ₂ | R ₄ | R ₃ | X ₁ | p |
|---------|--|---|----------------|-----------------|-----------------|---|
| A363 | CH ₂ CH(OCH ₃)CH ₂ |  | H | CF ₃ | O | 0 |
| A364 | CH=CHCH ₂ | CH ₃ | H | CF ₃ | O | 0 |
| A365 | CH=CHCH ₂ | CH ₃ CH ₂ | H | CF ₃ | O | 0 |
| A366 | CH=CHCH ₂ | (CH ₃) ₂ CH | H | CF ₃ | O | 0 |
| A367 | CH=CHCH ₂ | PhCH ₂ | H | CF ₃ | O | 0 |
| A368 | CH=CHCH ₂ | CH ₃ | H | CF ₃ | S | 0 |
| A369 | CH=CHCH ₂ | CH ₃ | H | CF ₃ | SO | 0 |
| A370 | CH=CHCH ₂ | CH ₃ | H | CF ₃ | SO ₂ | 0 |
| A371 | CH=CHCH ₂ | CH ₃ CH ₂ CH ₂ | H | CF ₃ | O | 0 |
| A372 | CH=CHCH ₂ | CH ₃ OCH ₂ | H | CF ₃ | O | 0 |
| A373 | CH=CHCH ₂ | CH ₃ CH ₂ OCH ₂ | H | CF ₃ | O | 0 |
| A374 | CH=CHCH ₂ | CH ₃ OCH ₂ CH ₂ | H | CF ₃ | O | 0 |
| A375 | CH=CHCH ₂ | CH ₃ CH ₂ OCH ₂ CH ₂ | H | CF ₃ | O | 0 |
| A376 | CH=CHCH ₂ | CH ₃ OC(CH ₃) ₂ CH ₂ | H | CF ₃ | O | 0 |
| A377 | CH=CHCH ₂ | CH ₃ OCH(CH ₃)CH ₂ | H | CF ₃ | O | 0 |
| A378 | CH=CHCH ₂ | CH ₃ OCH ₂ CH(CH ₃) | H | CF ₃ | O | 0 |
| A379 | CH=CHCH ₂ | CH ₃ OCH ₂ C(CH ₃) ₂ | H | CF ₃ | O | 0 |
| A380 | CH=CHCH ₂ | CH ₃ OCH(CH ₃) | H | CF ₃ | O | 0 |
| A381 | CH=CHCH ₂ | CH ₃ OC(CH ₃) ₂ | H | CF ₃ | O | 0 |
| A382 | CH=CHCH ₂ | HC≡CCH ₂ | H | CF ₃ | O | 0 |
| A383 | CH=CHCH ₂ | H ₂ C=CHCH ₂ | H | CF ₃ | O | 0 |
| A384 | CH=CHCH ₂ | CH ₃ C≡CCH ₂ | H | CF ₃ | O | 0 |
| A385 | CH=CHCH ₂ |  | H | CF ₃ | O | 0 |
| A386 | CH=CHCH ₂ |  | H | CF ₃ | O | 0 |
| A387 | CH=CHCH ₂ |  | H | CF ₃ | O | 0 |
| A388 | CH=CHCH ₂ |  | H | CF ₃ | O | 0 |
| A389 | CH=CHCH ₂ |  | H | CF ₃ | O | 0 |

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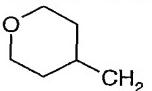
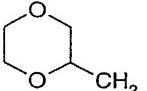
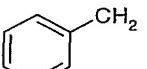
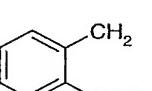
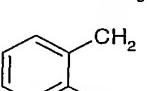
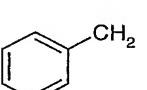
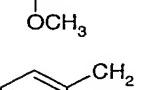
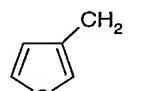
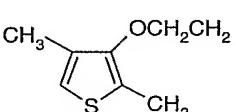
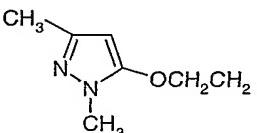
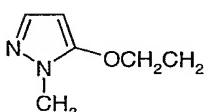
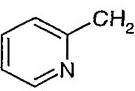
| Radical | R ₁ | R ₂ | R ₄ | R ₃ | X ₁ | p |
|---------|----------------------|---|----------------|-----------------|----------------|---|
| A390 | CH=CHCH ₂ |  | H | CF ₃ | O | 0 |
| A391 | CH=CHCH ₂ |  | H | CF ₃ | O | 0 |
| A392 | CH=CHCH ₂ |  | H | CF ₃ | O | 0 |
| A393 | CH=CHCH ₂ |  | H | CF ₃ | O | 0 |
| A394 | CH=CHCH ₂ |  | H | CF ₃ | O | 0 |
| A395 | CH=CHCH ₂ |  | H | CF ₃ | O | 0 |
| A396 | CH=CHCH ₂ |  | H | CF ₃ | O | 0 |
| A397 | CH=CHCH ₂ |  | H | CF ₃ | O | 0 |
| A398 | CH=CHCH ₂ |  | H | CF ₃ | O | 0 |
| A399 | CH=CHCH ₂ |  | H | CF ₃ | O | 0 |
| A400 | CH=CHCH ₂ |  | H | CF ₃ | O | 0 |
| A401 | CH=CHCH ₂ |  | H | CF ₃ | O | 0 |
| A402 | CH=CHCH ₂ |  | H | CF ₃ | O | 0 |

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| Radical | R ₁ | R ₂ | R ₄ | R ₃ | X ₁ | p |
|---------|----------------------|---|----------------|-----------------|----------------|---|
| A403 | CH=CHCH ₂ |  | H | CF ₃ | O | 0 |
| A404 | CH=CHCH ₂ |  | H | CF ₃ | O | 0 |
| A405 | CH=CHCH ₂ |  | H | CF ₃ | O | 0 |
| A406 | CH=CHCH ₂ |  | H | CF ₃ | O | 0 |
| A407 | CH=CHCH ₂ |  | H | CF ₃ | O | 0 |
| A408 | CH=CHCH ₂ |  | H | CF ₃ | O | 0 |
| A409 | CH=CHCH ₂ |  | H | CF ₃ | O | 0 |
| A410 | CH=CHCH ₂ |  | H | CF ₃ | O | 0 |
| A411 | CH=CHCH ₂ |  | H | CF ₃ | O | 0 |
| A412 | CH=CHCH ₂ |  | H | CF ₃ | O | 0 |
| A413 | CH=CHCH ₂ |  | H | CF ₃ | O | 0 |
| A414 | CH=CHCH ₂ |  | H | CF ₃ | O | 0 |

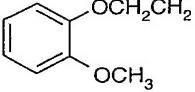
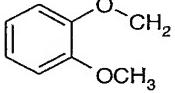
| Radical | R₁ | R₂ | R₄ | R₃ | X₁ | p |
|----------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------|
| A415 | CH=CHCH ₂ | | H | CF ₃ | O | 0 |
| A416 | CH=CHCH ₂ | | H | CF ₃ | O | 0 |
| A417 | CH=CHCH ₂ | | H | CF ₃ | O | 0 |
| A418 | CH=CHCH ₂ | | H | CF ₃ | O | 0 |
| A419 | CH=CHCH ₂ | | H | CF ₃ | O | 0 |
| A420 | CH=CHCH ₂ | | H | CF ₃ | O | 0 |
| A421 | CH=CHCH ₂ | | H | CF ₃ | O | 0 |
| A422 | CH=CHCH ₂ | | H | CF ₃ | O | 0 |
| A423 | CH=CHCH ₂ | | H | CF ₃ | O | 0 |
| A424 | CH=CHCH ₂ | | H | CF ₃ | O | 0 |
| A425 | CH=CHCH ₂ | | H | CF ₃ | O | 0 |
| A426 | CH=CHCH ₂ | | H | CF ₃ | O | 0 |
| A427 | CH=CHCH ₂ | | H | CF ₃ | O | 0 |
| A428 | CH=CHCH ₂ | | H | CF ₃ | O | 0 |

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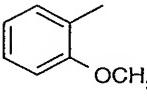
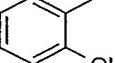
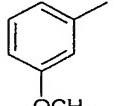
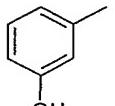
| Radical | R ₁ | R ₂ | R ₄ | R ₃ | X ₁ | p |
|---------|----------------------|---|----------------|-----------------|----------------|---|
| A429 | CH=CHCH ₂ |  | H | CF ₃ | O | 0 |
| A430 | CH=CHCH ₂ |  | H | CF ₃ | O | 0 |
| A431 | CH=CHCH ₂ |  | H | CF ₃ | O | 0 |
| A432 | CH=CHCH ₂ |  | H | CF ₃ | O | 0 |
| A433 | CH=CHCH ₂ |  | H | CF ₃ | O | 0 |
| A434 | CH=CHCH ₂ |  | H | CF ₃ | O | 0 |
| A435 | CH=CHCH ₂ |  | H | CF ₃ | O | 0 |
| A436 | CH=CHCH ₂ |  | H | CF ₃ | O | 0 |
| A437 | CH=CHCH ₂ |  | H | CF ₃ | O | 0 |
| A438 | CH=CHCH ₂ |  | H | CF ₃ | O | 0 |
| A439 | CH=CHCH ₂ |  | H | CF ₃ | O | 0 |
| A440 | CH=CHCH ₂ |  | H | CF ₃ | O | 0 |

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| Radical | R₁ | R₂ | R₄ | R₃ | X₁ | p |
|----------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------|
| A441 | CH=CHCH ₂ | | H | CF ₃ | O | 0 |
| A442 | CH=CHCH ₂ | | H | CF ₃ | O | 0 |
| A443 | CH=CHCH ₂ | | H | CF ₃ | O | 0 |
| A444 | CH=CHCH ₂ | | H | CF ₃ | O | 0 |
| A445 | CH=CHCH ₂ | | H | CF ₃ | O | 0 |
| A446 | CH=CHCH ₂ | | H | CF ₃ | O | 0 |
| A447 | CH=CHCH ₂ | | H | CF ₃ | O | 0 |
| A448 | CH=CHCH ₂ | | H | CF ₃ | O | 0 |
| A449 | CH=CHCH ₂ | | H | CF ₃ | O | 0 |
| A450 | CH=CHCH ₂ | | H | CF ₃ | O | 0 |
| A451 | CH=CHCH ₂ | | H | CF ₃ | O | 0 |
| A452 | CH=CHCH ₂ | | H | CF ₃ | O | 0 |

| Radical | R₁ | R₂ | R₄ | R₃ | X₁ | p |
|----------------|----------------------|---|----------------------|----------------------|----------------------|----------|
| A453 | CH=CHCH ₂ |  | H | CF ₃ | O | 0 |
| A454 | CH=CHCH ₂ |  | H | CF ₃ | O | 0 |
| A455 | C≡CCH ₂ | CH ₃ | H | CF ₃ | O | 0 |
| A456 | C≡CCH ₂ | CH ₃ CH ₂ | H | CF ₃ | O | 0 |
| A457 | C≡CCH ₂ | (CH ₃) ₂ CH | H | CF ₃ | O | 0 |
| A458 | C≡CCH ₂ | PhCH ₂ | H | CF ₃ | O | 0 |
| A459 | C≡CCH ₂ | CH ₃ | H | CF ₃ | S | 0 |
| A460 | C≡CCH ₂ | CH ₃ | H | CF ₃ | SO | 0 |
| A461 | C≡CCH ₂ | CH ₃ | H | CF ₃ | SO ₂ | 0 |
| A462 | C≡CCH ₂ | CH ₃ CH ₂ CH ₂ | H | CF ₃ | O | 0 |
| A463 | C≡CCH ₂ | CH ₃ OCH ₂ | H | CF ₃ | O | 0 |
| A464 | C≡CCH ₂ | CH ₃ CH ₂ OCH ₂ | H | CF ₃ | O | 0 |
| A465 | C≡CCH ₂ | CH ₃ OCH ₂ CH ₂ | H | CF ₃ | O | 0 |
| A466 | C≡CCH ₂ | CH ₃ CH ₂ OCH ₂ CH ₂ | H | CF ₃ | O | 0 |
| A467 | C≡CCH ₂ | CH ₃ OC(CH ₃) ₂ CH ₂ | H | CF ₃ | O | 0 |
| A468 | C≡CCH ₂ | CH ₃ OCH(CH ₃)CH ₂ | H | CF ₃ | O | 0 |
| A469 | C≡CCH ₂ | CH ₃ OCH ₂ CH(CH ₃) | H | CF ₃ | O | 0 |
| A470 | C≡CCH ₂ | CH ₃ OCH ₂ C(CH ₃) ₂ | H | CF ₃ | O | 0 |
| A471 | C≡CCH ₂ | CH ₃ OCH(CH ₃) | H | CF ₃ | O | 0 |
| A472 | C≡CCH ₂ | CH ₃ OC(CH ₃) ₂ | H | CF ₃ | O | 0 |
| A473 | C≡CCH ₂ | HC≡CCH ₂ | H | CF ₃ | O | 0 |
| A474 | C≡CCH ₂ | H ₂ C=CHCH ₂ | H | CF ₃ | O | 0 |
| A475 | C≡CCH ₂ | CH ₃ C≡CCH ₂ | H | CF ₃ | O | 0 |
| A476 | C≡CCH ₂ |  | H | CF ₃ | O | 0 |
| A477 | C≡CCH ₂ |  | H | CF ₃ | O | 0 |
| A478 | C≡CCH ₂ |  | H | CF ₃ | O | 0 |

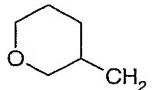
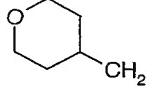
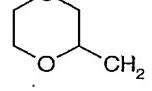
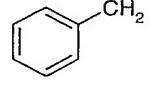
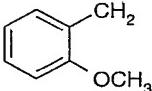
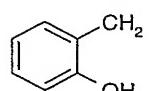
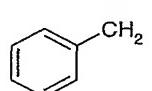
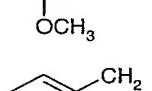
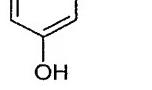
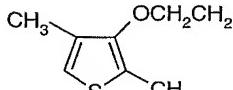
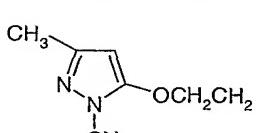
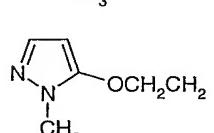
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| Radical | R ₁ | R ₂ | R ₄ | R ₃ | X ₁ | p |
|---------|--------------------|---|----------------|-----------------|----------------|---|
| A479 | C≡CCH ₂ |  | H | CF ₃ | O | 0 |
| A480 | C≡CCH ₂ |  | H | CF ₃ | O | 0 |
| A481 | C≡CCH ₂ |  | H | CF ₃ | O | 0 |
| A482 | C≡CCH ₂ |  | H | CF ₃ | O | 0 |
| A483 | C≡CCH ₂ |  | H | CF ₃ | O | 0 |
| A484 | C≡CCH ₂ |  | H | CF ₃ | O | 0 |
| A485 | C≡CCH ₂ |  | H | CF ₃ | O | 0 |
| A486 | C≡CCH ₂ |  | H | CF ₃ | O | 0 |
| A487 | C≡CCH ₂ |  | H | CF ₃ | O | 0 |
| A488 | C≡CCH ₂ |  | H | CF ₃ | O | 0 |
| A489 | C≡CCH ₂ |  | H | CF ₃ | O | 0 |
| A490 | C≡CCH ₂ |  | H | CF ₃ | O | 0 |
| A491 | C≡CCH ₂ |  | H | CF ₃ | O | 0 |
| A492 | C≡CCH ₂ |  | H | CF ₃ | O | 0 |

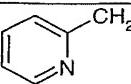
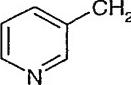
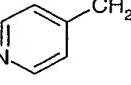
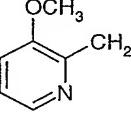
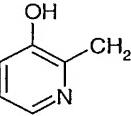
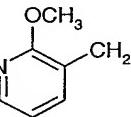
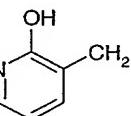
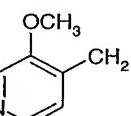
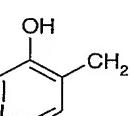
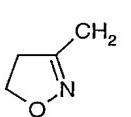
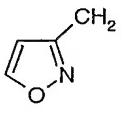
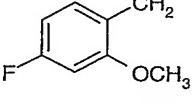
| Radical | R₁ | R₂ | R₄ | R₃ | X₁ | p |
|----------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------|
| A493 | C≡CCH ₂ | | H | CF ₃ | O | 0 |
| A494 | C≡CCH ₂ | | H | CF ₃ | O | 0 |
| A495 | C≡CCH ₂ | | H | CF ₃ | O | 0 |
| A496 | C≡CCH ₂ | | H | CF ₃ | O | 0 |
| A497 | C≡CCH ₂ | | H | CF ₃ | O | 0 |
| A498 | C≡CCH ₂ | | H | CF ₃ | O | 0 |
| A499 | C≡CCH ₂ | | H | CF ₃ | O | 0 |
| A500 | C≡CCH ₂ | | H | CF ₃ | O | 0 |
| A501 | C≡CCH ₂ | | H | CF ₃ | O | 0 |
| A502 | C≡CCH ₂ | | H | CF ₃ | O | 0 |
| A503 | C≡CCH ₂ | | H | CF ₃ | O | 0 |
| A504 | C≡CCH ₂ | | H | CF ₃ | O | 0 |

| Radical | R ₁ | R ₂ | R ₄ | R ₃ | X ₁ | p |
|---------|--------------------|----------------|----------------|-----------------|----------------|---|
| A505 | C≡CCH ₂ | | H | CF ₃ | O | 0 |
| A506 | C≡CCH ₂ | | H | CF ₃ | O | 0 |
| A507 | C≡CCH ₂ | | H | CF ₃ | O | 0 |
| A508 | C≡CCH ₂ | | H | CF ₃ | O | 0 |
| A509 | C≡CCH ₂ | | H | CF ₃ | O | 0 |
| A510 | C≡CCH ₂ | | H | CF ₃ | O | 0 |
| A511 | C≡CCH ₂ | | H | CF ₃ | O | 0 |
| A512 | C≡CCH ₂ | | H | CF ₃ | O | 0 |
| A513 | C≡CCH ₂ | | H | CF ₃ | O | 0 |
| A514 | C≡CCH ₂ | | H | CF ₃ | O | 0 |
| A515 | C≡CCH ₂ | | H | CF ₃ | O | 0 |
| A516 | C≡CCH ₂ | | H | CF ₃ | O | 0 |
| A517 | C≡CCH ₂ | | H | CF ₃ | O | 0 |
| A518 | C≡CCH ₂ | | H | CF ₃ | O | 0 |

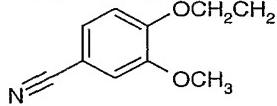
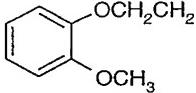
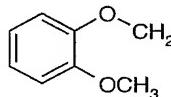
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| Radical | R₁ | R₂ | R₄ | R₃ | X₁ | p |
|----------------|----------------------|---|----------------------|----------------------|----------------------|----------|
| A519 | C≡CCH ₂ |  | H | CF ₃ | O | 0 |
| A520 | C≡CCH ₂ |  | H | CF ₃ | O | 0 |
| A521 | C≡CCH ₂ |  | H | CF ₃ | O | 0 |
| A522 | C≡CCH ₂ |  | H | CF ₃ | O | 0 |
| A523 | C≡CCH ₂ |  | H | CF ₃ | O | 0 |
| A524 | C≡CCH ₂ |  | H | CF ₃ | O | 0 |
| A525 | C≡CCH ₂ |  | H | CF ₃ | O | 0 |
| A526 | C≡CCH ₂ |  | H | CF ₃ | O | 0 |
| A527 | C≡CCH ₂ |  | H | CF ₃ | O | 0 |
| A528 | C≡CCH ₂ |  | H | CF ₃ | O | 0 |
| A529 | C≡CCH ₂ |  | H | CF ₃ | O | 0 |
| A530 | C≡CCH ₂ |  | H | CF ₃ | O | 0 |

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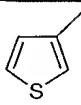
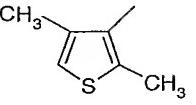
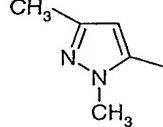
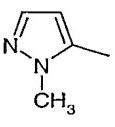
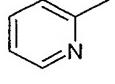
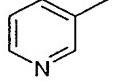
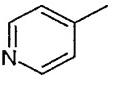
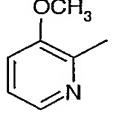
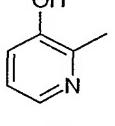
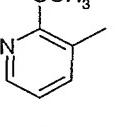
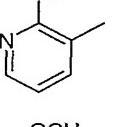
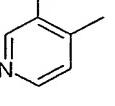
| Radical | R ₁ | R ₂ | R ₄ | R ₃ | X ₁ | p |
|---------|--------------------|---|----------------|-----------------|----------------|---|
| A531 | C≡CCH ₂ |  | H | CF ₃ | O | 0 |
| A532 | C≡CCH ₂ |  | H | CF ₃ | O | 0 |
| A533 | C≡CCH ₂ |  | H | CF ₃ | O | 0 |
| A534 | C≡CCH ₂ |  | H | CF ₃ | O | 0 |
| A535 | C≡CCH ₂ |  | H | CF ₃ | O | 0 |
| A536 | C≡CCH ₂ |  | H | CF ₃ | O | 0 |
| A537 | C≡CCH ₂ |  | H | CF ₃ | O | 0 |
| A538 | C≡CCH ₂ |  | H | CF ₃ | O | 0 |
| A539 | C≡CCH ₂ |  | H | CF ₃ | O | 0 |
| A540 | C≡CCH ₂ |  | H | CF ₃ | O | 0 |
| A541 | C≡CCH ₂ |  | H | CF ₃ | O | 0 |
| A542 | C≡CCH ₂ |  | H | CF ₃ | O | 0 |

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| Radical | R ₁ | R ₂ | R ₄ | R ₃ | X ₁ | p |
|---------|--------------------|---|----------------|--------------------|-----------------|---|
| A543 | C≡CCH ₂ |  | H | CF ₃ | O | 0 |
| A544 | C≡CCH ₂ |  | H | CF ₃ | O | 0 |
| A545 | C≡CCH ₂ |  | H | CF ₃ | O | 0 |
| A546 | CH ₂ | CH ₃ | H | CF ₂ Cl | O | 0 |
| A547 | CH ₂ | CH ₃ CH ₂ | H | CF ₂ Cl | O | 0 |
| A548 | CH ₂ | (CH ₃) ₂ CH | H | CF ₂ Cl | O | 0 |
| A549 | CH ₂ | PhCH ₂ | H | CF ₂ Cl | O | 0 |
| A550 | CH ₂ | CH ₃ | H | CF ₂ Cl | S | 0 |
| A551 | CH ₂ | CH ₃ | H | CF ₂ Cl | SO | 0 |
| A552 | CH ₂ | CH ₃ | H | CF ₂ Cl | SO ₂ | 0 |
| A553 | CH ₂ | CH ₃ CH ₂ CH ₂ | H | CF ₂ Cl | O | 0 |
| A554 | CH ₂ | CH ₃ OCH ₂ | H | CF ₂ Cl | O | 0 |
| A555 | CH ₂ | CH ₃ CH ₂ OCH ₂ | H | CF ₂ Cl | O | 0 |
| A556 | CH ₂ | CH ₃ OCH ₂ CH ₂ | H | CF ₂ Cl | O | 0 |
| A557 | CH ₂ | CH ₃ CH ₂ OCH ₂ CH ₂ | H | CF ₂ Cl | O | 0 |
| A558 | CH ₂ | CH ₃ OC(CH ₃) ₂ CH ₂ | H | CF ₂ Cl | O | 0 |
| A559 | CH ₂ | CH ₃ OCH(CH ₃)CH ₂ | H | CF ₂ Cl | O | 0 |
| A560 | CH ₂ | CH ₃ OCH ₂ CH(CH ₃) | H | CF ₂ Cl | O | 0 |
| A561 | CH ₂ | CH ₃ OCH ₂ C(CH ₃) ₂ | H | CF ₂ Cl | O | 0 |
| A562 | CH ₂ | CH ₃ OCH(CH ₃) | H | CF ₂ Cl | O | 0 |
| A563 | CH ₂ | CH ₃ OC(CH ₃) ₂ | H | CF ₂ Cl | O | 0 |
| A564 | CH ₂ | HC≡CCH ₂ | H | CF ₂ Cl | O | 0 |
| A565 | CH ₂ | H ₂ C=CHCH ₂ | H | CF ₂ Cl | O | 0 |
| A566 | CH ₂ | CH ₃ C≡CCH ₂ | H | CF ₂ Cl | O | 0 |
| A567 | CH ₂ |  | H | CF ₂ Cl | O | 0 |
| A568 | CH ₂ |  | H | CF ₂ Cl | O | 0 |

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| Radical | R ₁ | R ₂ | R ₄ | R ₃ | X ₁ | p |
|---------|-----------------|----------------|----------------|--------------------|----------------|---|
| A569 | CH ₂ | | H | CF ₂ Cl | O | 0 |
| A570 | CH ₂ | | H | CF ₂ Cl | O | 0 |
| A571 | CH ₂ | | H | CF ₂ Cl | O | 0 |
| A572 | CH ₂ | | H | CF ₂ Cl | O | 0 |
| A573 | CH ₂ | | H | CF ₂ Cl | O | 0 |
| A574 | CH ₂ | | H | CF ₂ Cl | O | 0 |
| A575 | CH ₂ | | H | CF ₂ Cl | O | 0 |
| A576 | CH ₂ | | H | CF ₂ Cl | O | 0 |
| A577 | CH ₂ | | H | CF ₂ Cl | O | 0 |
| A578 | CH ₂ | | H | CF ₂ Cl | O | 0 |
| A579 | CH ₂ | | H | CF ₂ Cl | O | 0 |
| A580 | CH ₂ | | H | CF ₂ Cl | O | 0 |
| A581 | CH ₂ | | H | CF ₂ Cl | O | 0 |
| A582 | CH ₂ | | H | CF ₂ Cl | O | 0 |

| Radical | R ₁ | R ₂ | R ₄ | R ₃ | X ₁ | p |
|---------|-----------------|---|----------------|--------------------|----------------|---|
| A583 | CH ₂ |  | H | CF ₂ Cl | O | 0 |
| A584 | CH ₂ |  | H | CF ₂ Cl | O | 0 |
| A585 | CH ₂ |  | H | CF ₂ Cl | O | 0 |
| A586 | CH ₂ |  | H | CF ₂ Cl | O | 0 |
| A587 | CH ₂ |  | H | CF ₂ Cl | O | 0 |
| A588 | CH ₂ |  | H | CF ₂ Cl | O | 0 |
| A589 | CH ₂ |  | H | CF ₂ Cl | O | 0 |
| A590 | CH ₂ |  | H | CF ₂ Cl | O | 0 |
| A591 | CH ₂ |  | H | CF ₂ Cl | O | 0 |
| A592 | CH ₂ |  | H | CF ₂ Cl | O | 0 |
| A593 | CH ₂ |  | H | CF ₂ Cl | O | 0 |
| A594 | CH ₂ |  | H | CF ₂ Cl | O | 0 |

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| Radical | R ₁ | R ₂ | R ₄ | R ₃ | X ₁ | p |
|---------|-----------------|----------------|----------------|--------------------|----------------|---|
| A595 | CH ₂ | | H | CF ₂ Cl | O | 0 |
| A596 | CH ₂ | | H | CF ₂ Cl | O | 0 |
| A597 | CH ₂ | | H | CF ₂ Cl | O | 0 |
| A598 | CH ₂ | | H | CF ₂ Cl | O | 0 |
| A599 | CH ₂ | | H | CF ₂ Cl | O | 0 |
| A600 | CH ₂ | | H | CF ₂ Cl | O | 0 |
| A601 | CH ₂ | | H | CF ₂ Cl | O | 0 |
| A602 | CH ₂ | | H | CF ₂ Cl | O | 0 |
| A603 | CH ₂ | | H | CF ₂ Cl | O | 0 |
| A604 | CH ₂ | | H | CF ₂ Cl | O | 0 |
| A605 | CH ₂ | | H | CF ₂ Cl | O | 0 |
| A606 | CH ₂ | | H | CF ₂ Cl | O | 0 |
| A607 | CH ₂ | | H | CF ₂ Cl | O | 0 |
| A608 | CH ₂ | | H | CF ₂ Cl | O | 0 |

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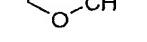
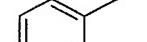
| Radical | R ₁ | R ₂ | R ₄ | R ₃ | X ₁ | p |
|---------|-----------------|----------------|----------------|--------------------|----------------|---|
| A609 | CH ₂ | | H | CF ₂ Cl | O | 0 |
| A610 | CH ₂ | | H | CF ₂ Cl | O | 0 |
| A611 | CH ₂ | | H | CF ₂ Cl | O | 0 |
| A612 | CH ₂ | | H | CF ₂ Cl | O | 0 |
| A613 | CH ₂ | | H | CF ₂ Cl | O | 0 |
| A614 | CH ₂ | | H | CF ₂ Cl | O | 0 |
| A615 | CH ₂ | | H | CF ₂ Cl | O | 0 |
| A616 | CH ₂ | | H | CF ₂ Cl | O | 0 |
| A617 | CH ₂ | | H | CF ₂ Cl | O | 0 |
| A618 | CH ₂ | | H | CF ₂ Cl | O | 0 |
| A619 | CH ₂ | | H | CF ₂ Cl | O | 0 |
| A620 | CH ₂ | | H | CF ₂ Cl | O | 0 |

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| Radical | R ₁ | R ₂ | R ₄ | R ₃ | X ₁ | p |
|---------|-----------------|----------------|----------------|--------------------|----------------|---|
| A621 | CH ₂ | | H | CF ₂ Cl | O | 0 |
| A622 | CH ₂ | | H | CF ₂ Cl | O | 0 |
| A623 | CH ₂ | | H | CF ₂ Cl | O | 0 |
| A624 | CH ₂ | | H | CF ₂ Cl | O | 0 |
| A625 | CH ₂ | | H | CF ₂ Cl | O | 0 |
| A626 | CH ₂ | | H | CF ₂ Cl | O | 0 |
| A627 | CH ₂ | | H | CF ₂ Cl | O | 0 |
| A628 | CH ₂ | | H | CF ₂ Cl | O | 0 |
| A629 | CH ₂ | | H | CF ₂ Cl | O | 0 |
| A630 | CH ₂ | | H | CF ₂ Cl | O | 0 |
| A631 | CH ₂ | | H | CF ₂ Cl | O | 0 |
| A632 | CH ₂ | | H | CF ₂ Cl | O | 0 |

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| Radical | R ₁ | R ₂ | R ₄ | R ₃ | X ₁ | p |
|---------|-----------------|---|----------------|--------------------|----------------|---|
| A633 | CH ₂ | | H | CF ₂ Cl | O | 0 |
| A634 | CH ₂ | | H | CF ₂ Cl | O | 0 |
| A635 | CH ₂ | | H | CF ₂ Cl | O | 0 |
| A636 | CH ₂ | | H | CF ₂ Cl | O | 0 |
| A637 | CH ₂ | CH ₃ | H | CHF ₂ | O | 0 |
| A638 | CH ₂ | CH ₂ CH ₃ | H | CHF ₂ | O | 0 |
| A639 | CH ₂ | (CH ₃) ₂ CH | H | CHF ₂ | O | 0 |
| A640 | CH ₂ | PhCH ₂ | H | CHF ₂ | O | 0 |
| A641 | CH ₂ | CH ₃ | H | CHF ₂ | S | 0 |
| A642 | CH ₂ | CH ₃ | H | CHF ₂ | O | 0 |
| A643 | CH ₂ | CH ₃ | H | CHF ₂ | O | 0 |
| A644 | CH ₂ | CH ₃ OCH ₂ | H | CHF ₂ | O | 0 |
| A645 | CH ₂ | CH ₃ CH ₂ OCH ₂ | H | CHF ₂ | O | 0 |
| A646 | CH ₂ | CH ₃ OCH ₂ CH ₂ | H | CHF ₂ | O | 0 |
| A647 | CH ₂ | CH ₃ CH ₂ OCH ₂ CH ₂ | H | CHF ₂ | O | 0 |
| A648 | CH ₂ | CH ₃ OC(CH ₃) ₂ CH ₂ | H | CHF ₂ | O | 0 |
| A649 | CH ₂ | CH ₃ OCH(CH ₃)CH ₂ | H | CHF ₂ | O | 0 |
| A650 | CH ₂ | CH ₃ OCH ₂ CH(CH ₃) | H | CHF ₂ | O | 0 |
| A651 | CH ₂ | CH ₃ OCH ₂ C(CH ₃) ₂ | H | CHF ₂ | O | 0 |
| A652 | CH ₂ | CH ₃ OCH(CH ₃) | H | CHF ₂ | O | 0 |
| A653 | CH ₂ | CH ₃ OC(CH ₃) ₂ | H | CHF ₂ | O | 0 |
| A654 | CH ₂ | HC≡CCH ₂ | H | CHF ₂ | O | 0 |
| A655 | CH ₂ | H ₂ C=CHCH ₂ | H | CHF ₂ | O | 0 |
| A656 | CH ₂ | CH ₃ C≡CCH ₂ | H | CHF ₂ | O | 0 |
| A657 | CH ₂ | | H | CHF ₂ | O | 0 |

| Radical | R ₁ | R ₂ | R ₄ | R ₃ | X ₁ | p |
|---------|-----------------|---|----------------|------------------|----------------|---|
| A658 | CH ₂ |  | H | CHF ₂ | O | 0 |
| A659 | CH ₂ |  | H | CHF ₂ | O | 0 |
| A660 | CH ₂ |  | H | CHF ₂ | O | 0 |
| A661 | CH ₂ |  | H | CHF ₂ | O | 0 |
| A662 | CH ₂ |  | H | CHF ₂ | O | 0 |
| A663 | CH ₂ |  | H | CHF ₂ | O | 0 |
| A664 | CH ₂ |  | H | CHF ₂ | O | 0 |
| A665 | CH ₂ |  | H | CHF ₂ | O | 0 |
| A666 | CH ₂ |  | H | CHF ₂ | O | 0 |
| A667 | CH ₂ |  | H | CHF ₂ | O | 0 |
| A668 | CH ₂ |  | H | CHF ₂ | O | 0 |
| A669 | CH ₂ |  | H | CHF ₂ | O | 0 |
| A670 | CH ₂ |  | H | CHF ₂ | O | 0 |
| A671 | CH ₂ |  | H | CHF ₂ | O | 0 |

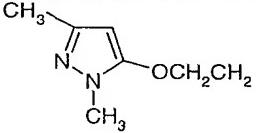
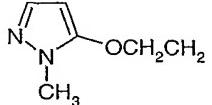
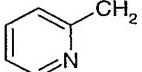
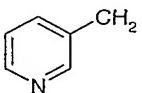
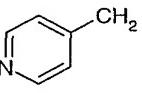
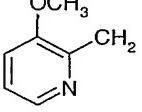
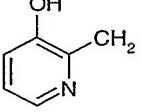
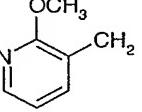
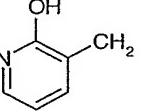
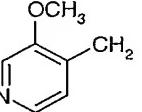
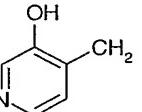
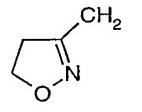
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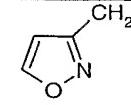
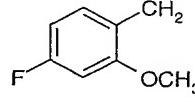
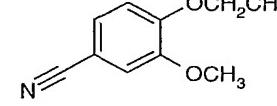
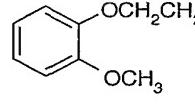
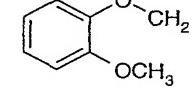
| Radical | R ₁ | R ₂ | R ₄ | R ₃ | X ₁ | p |
|---------|-----------------|----------------|----------------|------------------|----------------|---|
| A672 | CH ₂ | | H | CHF ₂ | O | 0 |
| A673 | CH ₂ | | H | CHF ₂ | O | 0 |
| A674 | CH ₂ | | H | CHF ₂ | O | 0 |
| A675 | CH ₂ | | H | CHF ₂ | O | 0 |
| A676 | CH ₂ | | H | CHF ₂ | O | 0 |
| A677 | CH ₂ | | H | CHF ₂ | O | 0 |
| A678 | CH ₂ | | H | CHF ₂ | O | 0 |
| A679 | CH ₂ | | H | CHF ₂ | O | 0 |
| A680 | CH ₂ | | H | CHF ₂ | O | 0 |
| A681 | CH ₂ | | H | CHF ₂ | O | 0 |
| A682 | CH ₂ | | H | CHF ₂ | S | 0 |
| A683 | CH ₂ | | H | CHF ₂ | SO | 0 |

| Radical | R ₁ | R ₂ | R ₄ | R ₃ | X ₁ | p |
|---------|-----------------|----------------|----------------|------------------|-----------------|---|
| A684 | CH ₂ | | H | CHF ₂ | SO ₂ | 0 |
| A685 | CH ₂ | | H | CHF ₂ | O | 0 |
| A686 | CH ₂ | | H | CHF ₂ | O | 0 |
| A687 | CH ₂ | | H | CHF ₂ | O | 0 |
| A688 | CH ₂ | | H | CHF ₂ | O | 0 |
| A689 | CH ₂ | | H | CHF ₂ | O | 0 |
| A690 | CH ₂ | | H | CHF ₂ | O | 0 |
| A691 | CH ₂ | | H | CHF ₂ | O | 0 |
| A692 | CH ₂ | | H | CHF ₂ | O | 0 |
| A693 | CH ₂ | | H | CHF ₂ | O | 0 |
| A694 | CH ₂ | | H | CHF ₂ | O | 0 |
| A695 | CH ₂ | | H | CHF ₂ | O | 0 |
| A696 | CH ₂ | | H | CHF ₂ | O | 0 |
| A697 | CH ₂ | | H | CHF ₂ | O | 0 |

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| Radical | R ₁ | R ₂ | R ₄ | R ₃ | X ₁ | p |
|---------|-----------------|----------------|----------------|------------------|----------------|---|
| A698 | CH ₂ | | H | CHF ₂ | O | 0 |
| A699 | CH ₂ | | H | CHF ₂ | O | 0 |
| A700 | CH ₂ | | H | CHF ₂ | O | 0 |
| A701 | CH ₂ | | H | CHF ₂ | O | 0 |
| A702 | CH ₂ | | H | CHF ₂ | O | 0 |
| A703 | CH ₂ | | H | CHF ₂ | O | 0 |
| A704 | CH ₂ | | H | CHF ₂ | O | 0 |
| A705 | CH ₂ | | H | CHF ₂ | O | 0 |
| A706 | CH ₂ | | H | CHF ₂ | O | 0 |
| A707 | CH ₂ | | H | CHF ₂ | O | 0 |
| A708 | CH ₂ | | H | CHF ₂ | O | 0 |
| A709 | CH ₂ | | H | CHF ₂ | O | 0 |

| Radical | R ₁ | R ₂ | R ₄ | R ₃ | X ₁ | p |
|---------|-----------------|---|----------------|------------------|----------------|---|
| A710 | CH ₂ |  | H | CHF ₂ | O | 0 |
| A711 | CH ₂ |  | H | CHF ₂ | O | 0 |
| A712 | CH ₂ |  | H | CHF ₂ | O | 0 |
| A713 | CH ₂ |  | H | CHF ₂ | O | 0 |
| A714 | CH ₂ |  | H | CHF ₂ | O | 0 |
| A715 | CH ₂ |  | H | CHF ₂ | O | 0 |
| A716 | CH ₂ |  | H | CHF ₂ | O | 0 |
| A717 | CH ₂ |  | H | CHF ₂ | O | 0 |
| A718 | CH ₂ |  | H | CHF ₂ | O | 0 |
| A719 | CH ₂ |  | H | CHF ₂ | O | 0 |
| A720 | CH ₂ |  | H | CHF ₂ | O | 0 |
| A721 | CH ₂ |  | H | CHF ₂ | O | 0 |

| Radical | R ₁ | R ₂ | R ₄ | R ₃ | X ₁ | p |
|---------|-----------------|---|----------------|------------------|-----------------|---|
| A722 | CH ₂ |  | H | CHF ₂ | O | 0 |
| A723 | CH ₂ |  | H | CHF ₂ | O | 0 |
| A724 | CH ₂ |  | H | CHF ₂ | O | 0 |
| A725 | CH ₂ |  | H | CHF ₂ | O | 0 |
| A726 | CH ₂ |  | H | CHF ₂ | O | 0 |
| A727 | CH ₂ | CH ₃ | H | CF ₃ | O | 1 |
| A728 | CH ₂ | CH ₂ CH ₃ | H | CF ₃ | O | 1 |
| A729 | CH ₂ | (CH ₃) ₂ CH | H | CF ₃ | O | 1 |
| A730 | CH ₂ | PhCH ₂ | H | CF ₃ | O | 1 |
| A731 | CH ₂ | CH ₃ | H | CF ₃ | S | 1 |
| A732 | CH ₂ | CH ₃ | H | CF ₃ | SO | 1 |
| A733 | CH ₂ | CH ₃ | H | CF ₃ | SO ₂ | 1 |
| A734 | CH ₂ | CH ₃ OCH ₂ | H | CF ₃ | O | 1 |
| A735 | CH ₂ | CH ₃ CH ₂ OCH ₂ | H | CF ₃ | O | 1 |
| A736 | CH ₂ | CH ₃ OCH ₂ CH ₂ | H | CF ₃ | O | 1 |
| A737 | CH ₂ | CH ₃ CH ₂ OCH ₂ CH ₂ | H | CF ₃ | O | 1 |
| A738 | CH ₂ | CH ₃ OC(CH ₃) ₂ CH ₂ | H | CF ₃ | O | 1 |
| A739 | CH ₂ | CH ₃ OCH(CH ₃)CH ₂ | H | CF ₃ | O | 1 |
| A740 | CH ₂ | CH ₃ OCH ₂ CH(CH ₃) | H | CF ₃ | O | 1 |
| A741 | CH ₂ | CH ₃ OCH ₂ C(CH ₃) ₂ | H | CF ₃ | O | 1 |
| A742 | CH ₂ | CH ₃ OCH(CH ₃) | H | CF ₃ | O | 1 |
| A743 | CH ₂ | CH ₃ OC(CH ₃) ₂ | H | CF ₃ | O | 1 |
| A744 | CH ₂ | HC≡CCH ₂ | H | CF ₃ | O | 1 |
| A745 | CH ₂ | H ₂ C=CHCH ₂ | H | CF ₃ | O | 1 |
| A746 | CH ₂ | CH ₃ C≡CCH ₂ | H | CF ₃ | O | 1 |

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| Radical | R ₁ | R ₂ | R ₄ | R ₃ | X ₁ | p |
|---------|-----------------|----------------|----------------|-----------------|----------------|---|
| A747 | CH ₂ | | H | CF ₃ | O | 1 |
| A748 | CH ₂ | | H | CF ₃ | O | 1 |
| A749 | CH ₂ | | H | CF ₃ | O | 1 |
| A750 | CH ₂ | | H | CF ₃ | O | 1 |
| A751 | CH ₂ | | H | CF ₃ | O | 1 |
| A752 | CH ₂ | | H | CF ₃ | O | 1 |
| A753 | CH ₂ | | H | CF ₃ | O | 1 |
| A754 | CH ₂ | | H | CF ₃ | O | 1 |
| A755 | CH ₂ | | H | CF ₃ | O | 1 |
| A756 | CH ₂ | | H | CF ₃ | O | 1 |
| A757 | CH ₂ | | H | CF ₃ | O | 1 |
| A758 | CH ₂ | | H | CF ₃ | O | 1 |
| A759 | CH ₂ | | H | CF ₃ | O | 1 |
| A760 | CH ₂ | | H | CF ₃ | O | 1 |
| A761 | CH ₂ | | H | CF ₃ | O | 1 |

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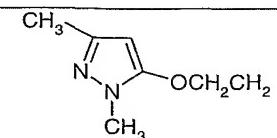
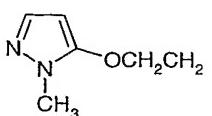
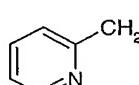
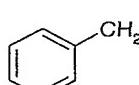
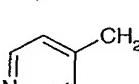
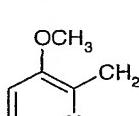
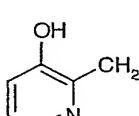
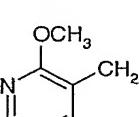
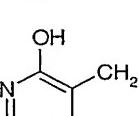
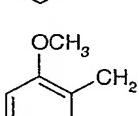
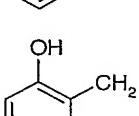
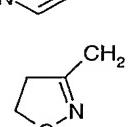
| Radical | R ₁ | R ₂ | R ₄ | R ₃ | X ₁ | p |
|---------|-----------------|----------------|----------------|-----------------|----------------|---|
| A762 | CH ₂ | | H | CF ₃ | O | 1 |
| A763 | CH ₂ | | H | CF ₃ | O | 1 |
| A764 | CH ₂ | | H | CF ₃ | O | 1 |
| A765 | CH ₂ | | H | CF ₃ | O | 1 |
| A766 | CH ₂ | | H | CF ₃ | O | 1 |
| A767 | CH ₂ | | H | CF ₃ | O | 1 |
| A768 | CH ₂ | | H | CF ₃ | O | 1 |
| A769 | CH ₂ | | H | CF ₃ | O | 1 |
| A770 | CH ₂ | | H | CF ₃ | O | 1 |
| A771 | CH ₂ | | H | CF ₃ | O | 1 |
| A772 | CH ₂ | | H | CF ₃ | O | 1 |
| A773 | CH ₂ | | H | CF ₃ | O | 1 |

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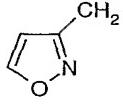
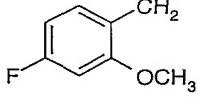
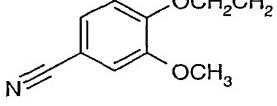
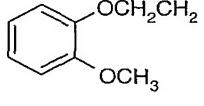
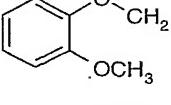
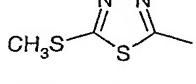
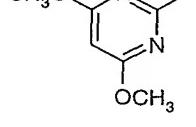
| Radical | R ₁ | R ₂ | R ₄ | R ₃ | X ₁ | p |
|---------|-----------------|----------------|----------------|-----------------|----------------|---|
| A774 | CH ₂ | | H | CF ₃ | O | 1 |
| A775 | CH ₂ | | H | CF ₃ | O | 1 |
| A776 | CH ₂ | | H | CF ₃ | O | 1 |
| A777 | CH ₂ | | H | CF ₃ | O | 1 |
| A778 | CH ₂ | | H | CF ₃ | O | 1 |
| A779 | CH ₂ | | H | CF ₃ | O | 1 |
| A780 | CH ₂ | | H | CF ₃ | O | 1 |
| A781 | CH ₂ | | H | CF ₃ | O | 1 |
| A782 | CH ₂ | | H | CF ₃ | O | 1 |
| A783 | CH ₂ | | H | CF ₃ | O | 1 |
| A784 | CH ₂ | | H | CF ₃ | O | 1 |
| A785 | CH ₂ | | H | CF ₃ | O | 1 |
| A786 | CH ₂ | | H | CF ₃ | O | 1 |
| A787 | CH ₂ | | H | CF ₃ | O | 1 |

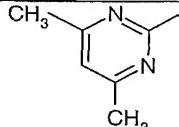
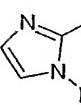
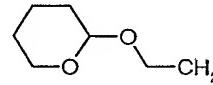
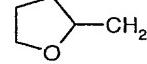
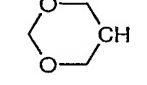
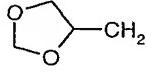
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| Radical | R ₁ | R ₂ | R ₄ | R ₃ | X ₁ | p |
|---------|-----------------|----------------|----------------|-----------------|----------------|---|
| A788 | CH ₂ | | H | CF ₃ | O | 1 |
| A789 | CH ₂ | | H | CF ₃ | O | 1 |
| A790 | CH ₂ | | H | CF ₃ | O | 1 |
| A791 | CH ₂ | | H | CF ₃ | O | 1 |
| A792 | CH ₂ | | H | CF ₃ | O | 1 |
| A793 | CH ₂ | | H | CF ₃ | O | 1 |
| A794 | CH ₂ | | H | CF ₃ | O | 1 |
| A795 | CH ₂ | | H | CF ₃ | O | 1 |
| A796 | CH ₂ | | H | CF ₃ | O | 1 |
| A797 | CH ₂ | | H | CF ₃ | O | 1 |
| A798 | CH ₂ | | H | CF ₃ | O | 1 |
| A799 | CH ₂ | | H | CF ₃ | O | 1 |

| Radical | R ₁ | R ₂ | R ₄ | R ₃ | X ₁ | p |
|---------|-----------------|---|----------------|-----------------|----------------|---|
| A800 | CH ₂ |  | H | CF ₃ | O | 1 |
| A801 | CH ₂ |  | H | CF ₃ | O | 1 |
| A802 | CH ₂ |  | H | CF ₃ | O | 1 |
| A803 | CH ₂ |  | H | CF ₃ | O | 1 |
| A804 | CH ₂ |  | H | CF ₃ | O | 1 |
| A805 | CH ₂ |  | H | CF ₃ | O | 1 |
| A806 | CH ₂ |  | H | CF ₃ | O | 1 |
| A807 | CH ₂ |  | H | CF ₃ | O | 1 |
| A808 | CH ₂ |  | H | CF ₃ | O | 1 |
| A809 | CH ₂ |  | H | CF ₃ | O | 1 |
| A810 | CH ₂ |  | H | CF ₃ | O | 1 |
| A811 | CH ₂ |  | H | CF ₃ | O | 1 |

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| Radical | R ₁ | R ₂ | R ₄ | R ₃ | X ₁ | p |
|---------|-----------------|---|-----------------|--------------------|-----------------|---|
| A812 | CH ₂ |  | H | CF ₃ | O | 1 |
| A813 | CH ₂ |  | H | CF ₃ | O | 1 |
| A814 | CH ₂ |  | H | CF ₃ | O | 1 |
| A815 | CH ₂ |  | H | CF ₃ | O | 1 |
| A816 | CH ₂ |  | H | CF ₃ | O | 1 |
| A817 | CH ₂ | CH ₃ SCH ₂ CH ₂ | H | CF ₃ | O | 0 |
| A818 | CH ₂ | CH ₃ SOCH ₂ CH ₂ | H | CF ₃ | O | 0 |
| A819 | CH ₂ | CH ₃ SO ₂ CH ₂ CH ₂ | H | CF ₃ | O | 0 |
| A820 | CH ₂ | CH ₃ OCH ₂ CH ₂ | H | CF ₂ Cl | O | 1 |
| A821 | CH ₂ | CH ₃ OCH ₂ CH ₂ | H | CF ₂ H | O | 1 |
| A822 | CH ₂ | CH ₃ OCH ₂ CH ₂ | F | CF ₃ | O | 0 |
| A823 | CH ₂ | CH ₃ OCH ₂ CH ₂ | CH ₃ | CF ₃ | O | 0 |
| A824 | CH ₂ | CH ₃ OCH ₂ CH ₂ | CH ₃ | CF ₃ | O | 1 |
| A825 | CH ₂ | CH ₃ OCH ₂ CH ₂ | H | CF ₃ | S | 0 |
| A826 | CH ₂ | CH ₃ OCH ₂ CH ₂ | H | CF ₃ | SO | 0 |
| A827 | CH ₂ | CH ₃ OCH ₂ CH ₂ | CH ₃ | CF ₃ | SO ₂ | 0 |
| A828 | CH ₂ | CH ₃ SO ₂ CH ₂ CH ₂ | CH ₃ | CF ₃ | O | 0 |
| A829 | CH ₂ |  | H | CF ₃ | S | 0 |
| A830 | CH ₂ |  | H | CF ₃ | S | 0 |

| Radical | R ₁ | R ₂ | R ₄ | R ₃ | X ₁ | p |
|---------|-----------------|---|-----------------|-----------------|----------------|---|
| A831 | CH ₂ |  | CH ₃ | CF ₃ | S | 0 |
| A832 | CH ₂ |  | CH ₃ | CF ₃ | S | 0 |
| A833 | CH ₂ | CH ₃ C(O) | H | CF ₃ | O | 0 |
| A834 | CH ₂ | CF ₃ CH ₂ | H | CF ₃ | O | 0 |
| A835 | CH ₂ | CH ₃ OCH ₂ CH ₂ OCH ₂ CH ₂ | H | CF ₃ | O | 0 |
| A836 | CH ₂ | HC≡CCH ₂ CH ₂ | H | CF ₃ | O | 0 |
| A837 | CH ₂ |  | H | CF ₃ | O | 0 |
| A838 | CH ₂ | CH ₃ CH ₂ C(OCH ₃)HOCH ₂ CH ₂ | H | CF ₃ | O | 0 |
| A839 | CH ₂ | (CH ₃) ₃ CC(O) | H | CF ₃ | O | 0 |
| A840 | CH ₂ | CH ₂ =CHCH ₂ OCH ₂ CH ₂ | H | CF ₃ | O | 0 |
| A841 | CH ₂ | CH ₃ CH ₂ CH ₂ OCH ₂ CH ₂ | H | CF ₃ | O | 0 |
| A842 | CH ₂ |  | H | CF ₃ | O | 0 |
| A843 | CH ₂ | n-Heptyl-C(O) | H | CF ₃ | O | 0 |
| A844 | CH ₂ | Phenyl-C(O) | H | CF ₃ | O | 0 |
| A845 | CH ₂ | CF ₃ CH ₂ OCH ₂ CH ₂ | H | CF ₃ | O | 0 |
| A846 | CH ₂ | CH ₃ OCH ₂ CH ₂ CH ₂ | H | CF ₃ | O | 0 |
| A847 | CH ₂ | HOCH ₂ CH ₂ CH ₂ | H | CF ₃ | O | 0 |
| A848 | CH ₂ |  | H | CF ₃ | O | 0 |
| A849 | CH ₂ | N≡CCH ₂ CH ₂ | H | CF ₃ | O | 0 |
| A850 | CH ₂ | CICH ₂ CH ₂ | H | CF ₃ | O | 0 |
| A851 | CH ₂ |  | H | CF ₃ | O | 0 |
| A852 | CH ₂ |  | H | CF ₃ | O | 0 |
| A853 | CH ₂ | CH ₃ OCH ₂ C(Br)HCH ₂ | H | CF ₃ | O | 0 |

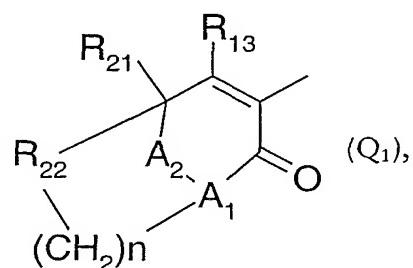
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| Radical | R ₁ | R ₂ | R ₄ | R ₃ | X ₁ | p |
|---------|-----------------|---|----------------|-----------------|--|---|
| A854 | CH ₂ | | H | CF ₃ | O | 0 |
| A855 | CH ₂ | | H | CF ₃ | O | 0 |
| A856 | CH ₂ | HOCH ₂ CH ₂ | H | CF ₃ | O | 0 |
| A857 | CH ₂ | | H | CF ₃ | O | 0 |
| A858 | CH ₂ | CH ₃ (OCH ₂ CH ₂) ₃ | H | CF ₃ | O | 0 |
| A859 | CH ₂ | CH ₃ CH ₂ OC(CH ₃)HOCH ₂ CH ₂ | H | CF ₃ | O | 0 |
| A860 | CH ₂ | n-Heptyl-C(O)OCH ₂ CH ₂ | H | CF ₃ | O | 0 |
| A861 | CH ₂ | CH ₃ C(O)OCH ₂ CH ₂ | H | CF ₃ | O | 0 |
| A862 | CH ₂ | CH ₃ SO ₂ OCH ₂ CH ₂ | H | CF ₃ | O | 0 |
| A863 | CH ₂ | | H | CF ₃ | O | 0 |
| A864 | CH ₂ | CH ₃ | H | CF ₃ | -NCH ₃ SO ₂ ⁻ | 0 |
| A865 | CH ₂ | HOCH ₂ C(OH)HCH ₂ | H | CF ₃ | O | 0 |
| A866 | CH ₂ | Phenyl-C(O)OCH ₂ CH ₂ | H | CF ₃ | O | 0 |
| A867 | CH ₂ | t-Butyl-C(O)OCH ₂ CH ₂ | H | CF ₃ | O | 0 |
| A868 | CH ₂ | CH ₃ OC(O)CH ₂ | H | CF ₃ | O | 0 |

In the table below, in the case of rings, the ring attachment points for the substituents A₁ and A₂ are at the carbon atom which is marked "C", for example

, in the case of open-chain structures, "(CH₃)₂C" denotes, for example, .

In the formula A-Q, Q denotes Q₁

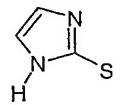
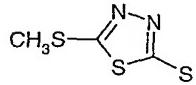


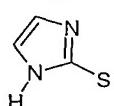
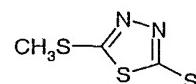
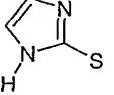
and Q₁ denotes the following radicals B:

| Radical | A ₁ | A ₂ | n | R ₂₁ | R ₂₂ | R ₁₃ |
|---------|-----------------------------------|-----------------------------------|---|-----------------|---------------------------------------|-----------------|
| B1 | CH ₂ | CH ₂ | 0 | H | H | OH |
| B2 | CH ₂ | CH ₂ | 0 | CH ₃ | H | OH |
| B3 | CH ₂ | CH ₂ | 0 | CH ₃ | CH ₃ | OH |
| B4 | (CH ₃)CH | CH ₂ | 0 | CH ₃ | CH ₃ | OH |
| B5 | (CH ₃) ₂ C | CH ₂ | 0 | CH ₃ | CH ₃ | OH |
| B6 | CH | CH | 0 | CH ₃ | - | OH |
| B7 | CH ₂ | CH ₂ | 0 | CH ₃ | CH ₂ =CHCH ₂ | OH |
| B8 | CH ₂ | CH ₂ | 0 | CH ₃ | HC≡CCH ₂ | OH |
| B9 | CH ₂ | CH ₂ | 0 | CH ₃ | CH ₃ S | OH |
| B10 | CH ₂ | CH ₂ | 0 | CH ₃ | CH ₃ SO | OH |
| B11 | CH ₂ | CH ₂ | 0 | CH ₃ | CH ₃ SO ₂ | OH |
| B12 | CH ₂ | CH ₂ | 0 | CH ₃ | CH ₃ O | OH |
| B13 | CH ₂ | CH ₂ | 0 | CH ₃ | CH ₃ OC(O) | OH |
| B14 | CH ₂ | CH ₂ | 0 | CH ₃ | CH ₃ CH ₂ OC(O) | OH |
| B15 | CH ₂ | (CH ₃) ₂ C | 0 | H | H | OH |
| B16 | | CH ₂ | 0 | H | H | OH |
| B17 | | CH ₂ | 0 | H | H | OH |
| B18 | | CH ₂ | 0 | CH ₃ | H | OH |
| B19 | | CH ₂ | 0 | CH ₃ | CH ₃ | OH |
| B20 | | CH ₂ | 0 | H | H | OH |
| B21 | | CH ₂ | 0 | CH ₃ | H | OH |
| B22 | | CH ₂ | 0 | CH ₃ | CH ₃ | OH |
| B23 | (CH ₃) ₂ C | O | 0 | CH ₃ | CH ₃ | OH |
| B24 | CH ₂ | O | 0 | CH ₃ | CH ₃ | OH |

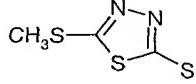
| Radical | A ₁ | A ₂ | n | R ₂₁ | R ₂₂ | R ₁₃ |
|---------|---|---|---|-----------------|-----------------|-----------------|
| B25 | CH ₃ N | O | 0 | CH ₃ | CH ₃ | OH |
| B26 |  | O | 0 | CH ₃ | CH ₃ | OH |
| B27 | CH ₃ N | CH ₂ | 0 | CH ₃ | CH ₃ | OH |
| B28 | CH ₃ N | (CH ₃)CH | 0 | H | H | OH |
| B29 | CH ₃ N | (CH ₃)CH | 0 | CH ₃ | H | OH |
| B30 | NH | (CH ₃)C | 0 | H | - | OH |
| B31 | NH | CH | 0 | CH ₃ | - | OH |
| B32 | CH ₃ N | (CH ₃)C | 0 | H | - | OH |
| B33 | CH ₃ N | CH | 0 | CH ₃ | - | OH |
| B34 | O | (CH ₃) ₂ C | 0 | H | - | OH |
| B35 | O | (CH ₃) ₂ C | 0 | CH ₃ | CH ₃ | OH |
| B36 | O | (CH ₃) ₂ C | 0 | CH ₃ | H | OH |
| B37 | O | (CH ₃)C | 0 | H | - | OH |
| B38 | O | CH | 0 | CH ₃ | - | OH |
| B39 | (CH ₃) ₂ C | C=O | 0 | CH ₃ | CH ₃ | OH |
| B40 | (CH ₃) ₂ C | (OH)CH | 0 | CH ₃ | CH ₃ | OH |
| B41 |  | C=O | 0 | CH ₃ | CH ₃ | OH |
| B42 |  | C=O | 0 | CH ₂ | CH ₂ | OH |
| B43 | (CH ₃) ₂ C |  | 0 | CH ₃ | CH ₃ | OH |
| B44 | (CH ₃) ₂ C |  | 0 | CH ₃ | CH ₃ | OH |
| B45 | (CH ₃) ₂ C |  | 0 | CH ₃ | CH ₃ | OH |
| B46 | (CH ₃) ₂ C |  | 0 | CH ₃ | CH ₃ | OH |
| B47 | (CH ₃) ₂ C | HON=C | 0 | CH ₃ | CH ₃ | OH |
| B48 | (CH ₃) ₂ C | CH ₃ ON=C | 0 | CH ₃ | CH ₃ | OH |
| B49 | (CH ₃) ₂ C | BnON=C | 0 | CH ₃ | CH ₃ | OH |
| B50 | CH | O | 1 | H | CH ₂ | OH |
| B51 | CH | C=O | 1 | H | CH ₂ | OH |

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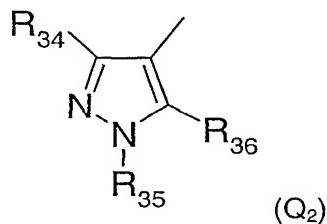
| Radical | A₁ | A₂ | n | R₂₁ | R₂₂ | R₁₃ |
|----------------|-----------------------------------|---------------------------------|----------|-----------------------|-----------------------|---|
| B52 | CH | CH ₂ | 1 | H | CH ₂ | OH |
| B53 | CH | CH ₃ N | 1 | H | CH ₂ | OH |
| B54 | CH | CH ₂ CH ₂ | 1 | H | CH ₂ | OH |
| B55 | CH | C=O | 2 | H | CH ₂ | OH |
| B56 | CH | CH ₂ | 2 | H | CH ₂ | OH |
| B57 | CH | CH ₂ | 1 | H | CH ₂ | Cl |
| B58 | CH | CH ₂ | 1 | H | CH ₂ | NH ₂ |
| B59 | CH | CH ₂ | 1 | H | CH ₂ | CH ₃ SO ₂ NH |
| B60 | CH | CH ₂ | 1 | H | CH ₂ | CH ₃ OCH ₂ CH ₂ S |
| B61 | CH | CH ₂ | 1 | H | CH ₂ | CH ₃ OCH ₂ CH ₂ SO |
| B62 | CH | CH ₂ | 1 | H | CH ₂ | CH ₃ OCH ₂ CH ₂ SO ₂ |
| B63 | CH | CH ₂ | 1 | H | CH ₂ | (CH ₃) ₂ NC(O)NH |
| B64 | CH | CH ₂ | 1 | H | CH ₂ | PhC(O)O |
| B65 | CH | CH ₂ | 1 | H | CH ₂ | CH ₃ OC(O)O |
| B66 | CH | CH ₂ | 1 | H | CH ₂ | CH ₃ (CH ₂) ₇ S |
| B67 | CH | CH ₂ | 1 | H | CH ₂ | CH ₃ (CH ₂) ₇ SO |
| B68 | CH | CH ₂ | 1 | H | CH ₂ | CH ₃ (CH ₂) ₇ SO ₂ |
| B69 | CH | CH ₂ | 1 | H | CH ₂ | (CH ₃) ₂ NSO ₂ NH |
| B70 | CH | CH ₂ | 1 | H | CH ₂ | PhS |
| B71 | CH | CH ₂ | 1 | H | CH ₂ | PhSO |
| B72 | CH | CH ₂ | 1 | H | CH ₂ | PhSO ₂ |
| B73 | CH | CH ₂ | 1 | H | CH ₂ |  |
| B74 | CH | CH ₂ | 1 | H | CH ₂ |  |
| B75 | (CH ₃) ₂ C | C=O | 0 | CH ₃ | CH ₃ | Cl |
| B76 | (CH ₃) ₂ C | C=O | 0 | CH ₃ | CH ₃ | NH ₂ |
| B77 | (CH ₃) ₂ C | C=O | 0 | CH ₃ | CH ₃ | CH ₃ SO ₂ NH |
| B78 | (CH ₃) ₂ C | C=O | 0 | CH ₃ | CH ₃ | CH ₃ OCH ₂ CH ₂ S |
| B79 | (CH ₃) ₂ C | C=O | 0 | CH ₃ | CH ₃ | CH ₃ OCH ₂ CH ₂ SO |
| B80 | (CH ₃) ₂ C | C=O | 0 | CH ₃ | CH ₃ | CH ₃ OCH ₂ CH ₂ SO ₂ |
| B81 | (CH ₃) ₂ C | C=O | 0 | CH ₃ | CH ₃ | (CH ₃) ₂ NC(O)NH |

| Radical | A₁ | A₂ | n | R₂₁ | R₂₂ | R₁₃ |
|----------------|-----------------------------------|----------------------|----------|-----------------------|-----------------------|---|
| B82 | (CH ₃) ₂ C | C=O | 0 | CH ₃ | CH ₃ | PhC(O)O |
| B83 | (CH ₃) ₂ C | C=O | 0 | CH ₃ | CH ₃ | CH ₃ OC(O)O |
| B84 | (CH ₃) ₂ C | C=O | 0 | CH ₃ | CH ₃ | CH ₃ (CH ₂) ₇ S |
| B85 | (CH ₃) ₂ C | C=O | 0 | CH ₃ | CH ₃ | CH ₃ (CH ₂) ₇ SO |
| B86 | (CH ₃) ₂ C | C=O | 0 | CH ₃ | CH ₃ | CH ₃ (CH ₂) ₇ SO ₂ |
| B87 | (CH ₃) ₂ C | C=O | 0 | CH ₃ | CH ₃ | (CH ₃) ₂ NSO ₂ NH |
| B88 | (CH ₃) ₂ C | C=O | 0 | CH ₃ | CH ₃ | PhS |
| B89 | (CH ₃) ₂ C | C=O | 0 | CH ₃ | CH ₃ | PhSO |
| B90 | (CH ₃) ₂ C | C=O | 0 | CH ₃ | CH ₃ | PhSO ₂ |
| B91 | (CH ₃) ₂ C | C=O | 0 | CH ₃ | CH ₃ |  |
| B92 | (CH ₃) ₂ C | C=O | 0 | CH ₃ | CH ₃ |  |
| B93 | (CH ₃) ₂ C | CH ₂ | 0 | H | H | Cl |
| B94 | (CH ₃) ₂ C | CH ₂ | 0 | H | H | NH ₂ |
| B96 | (CH ₃) ₂ C | CH ₂ | 0 | H | H | CH ₃ OCH ₂ CH ₂ S |
| B97 | (CH ₃) ₂ C | CH ₂ | 0 | H | H | CH ₃ OCH ₂ CH ₂ SO |
| B98 | (CH ₃) ₂ C | CH ₂ | 0 | H | H | CH ₃ OCH ₂ CH ₂ SO ₂ |
| B99 | (CH ₃) ₂ C | CH ₂ | 0 | H | H | (CH ₃) ₂ NC(O)NH |
| B100 | (CH ₃) ₂ C | CH ₂ | 0 | H | H | PhC(O)O |
| B101 | (CH ₃) ₂ C | CH ₂ | 0 | H | H | CH ₃ OC(O)O |
| B102 | (CH ₃) ₂ C | CH ₂ | 0 | H | H | CH ₃ (CH ₂) ₇ S |
| B103 | (CH ₃) ₂ C | CH ₂ | 0 | H | H | CH ₃ (CH ₂) ₇ SO |
| B104 | (CH ₃) ₂ C | CH ₂ | 0 | H | H | CH ₃ (CH ₂) ₇ SO ₂ |
| B105 | (CH ₃) ₂ C | CH ₂ | 0 | H | H | (CH ₃) ₂ NSO ₂ NH |
| B106 | (CH ₃) ₂ C | CH ₂ | 0 | H | H | PhS |
| B107 | (CH ₃) ₂ C | CH ₂ | 0 | H | H | PhSO |
| B108 | (CH ₃) ₂ C | CH ₂ | 0 | H | H | PhSO ₂ |
| B109 | (CH ₃) ₂ C | CH ₂ | 0 | H | H |  |

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| Radical | A ₁ | A ₂ | n | R ₂₁ | R ₂₂ | R ₁₃ |
|---------|-----------------------------------|----------------------|---|-----------------|-----------------|---|
| B110 | (CH ₃) ₂ C | CH ₂ | 0 | H | H |  |
| B111 | CH ₂ | (CH ₃)CH | 0 | H | H | OH |
| B112 | CH ₂ | CH ₂ | 1 | H | CH ₂ | t-Butyl-C(O)O |
| B113 | CH ₂ | CH ₂ | 1 | H | CH ₂ | t-Heptyl-C(O)O |

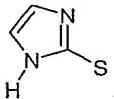
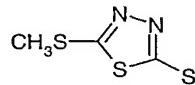
or Q in the formula A-Q denotes Q₂



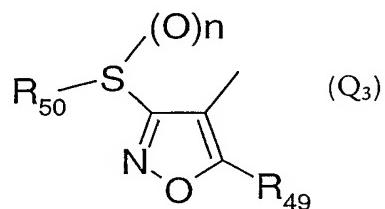
and Q₂ denotes the following radicals C:

| Radical | R ₃₄ | R ₃₅ | R ₃₆ |
|---------|---|---------------------------------|--|
| C1 | CH ₃ | H | OH |
| C2 | CH ₃ | CH ₃ | OH |
| C3 | H | HC≡CCH ₂ | OH |
| C4 | H | CH ₃ SO ₂ | OH |
| C5 | H | CH ₃ | OH |
| C6 | H | PhCH ₂ | OH |
| C7 | CF ₃ | CH ₃ | OH |
| C8 | ▷CH | CH ₃ | OH |
| C9 | CH ₃ OCH ₂ CH ₂ OCH ₂ | CH ₃ | OH |
| C10 | H | CH ₃ | Cl |
| C11 | H | CH ₃ | NH ₂ |
| C12 | H | CH ₃ | CH ₃ SO ₂ NH |
| C13 | H | CH ₃ | CH ₃ OCH ₂ CH ₂ S |
| C14 | H | CH ₃ | CH ₃ OCH ₂ CH ₂ SO |
| C15 | H | CH ₃ | CH ₃ OCH ₂ CH ₂ SO ₂ |

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| Radical | R ₃₄ | R ₃₅ | R ₃₆ |
|---------|-----------------|-----------------|---|
| C16 | H | CH ₃ | (CH ₃) ₂ NC(O)NH |
| C17 | H | CH ₃ | PhC(O)O |
| C18 | H | CH ₃ | CH ₃ OC(O)O |
| C19 | H | CH ₃ | CH ₃ (CH ₂) ₇ S |
| C20 | H | CH ₃ | CH ₃ (CH ₂) ₇ SO |
| C21 | H | CH ₃ | CH ₃ (CH ₂) ₇ SO ₂ |
| C22 | H | CH ₃ | (CH ₃) ₂ NSO ₂ NH |
| C23 | H | CH ₃ | PhS |
| C24 | H | CH ₃ | PhSO |
| C25 | H | CH ₃ | PhSO ₂ |
| C26 | H | CH ₃ |  |
| C27 | H | CH ₃ |  |
| C28 | H | CH ₃ | CH ₃ SO ₂ O |
| C29 | H | CH ₃ | p-TolylSO ₂ O |

or Q in the formula A-Q denotes Q₃



and Q₃ denotes the following radicals D (the point of attachment of R₄₉ to the heterocycle is the "CH" group):

| Radical | R ₄₉ | R ₅₀ | n |
|---------|---|-----------------|---|
| D1 |  | CH ₃ | 0 |

| Radical | R ₄₉ | R ₅₀ | n |
|---------|-----------------|-------------------|---|
| D2 | ▷CH | CH ₃ | 1 |
| D3 | ▷CH | CH ₃ | 2 |
| D4 | ▷CH | CF ₃ | 0 |
| D5 | ▷CH | CF ₃ | 1 |
| D6 | ▷CH | CF ₃ | 2 |
| D7 | ▷CH | Ph | 0 |
| D8 | ▷CH | Ph | 1 |
| D9 | ▷CH | Ph | 2 |
| D10 | ▷CH | PhCH ₂ | 0 |
| D11 | ▷CH | PhCH ₂ | 1 |
| D12 | ▷CH | PhCH ₂ | 2 |

Table 1: Intermediates for preparing the compounds of the formula I, represented as formula

A-Q

in which Q denotes hydroxyl:

| <u>OH</u> |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| - | - | - | - | - | - | - | - | A8 | A9 | A10 | A11 | A12 | |
| A13 | A14 | A15 | A16 | A17 | A18 | A19 | A20 | A21 | A22 | A23 | A24 | | |
| A25 | A26 | A27 | A28 | A29 | A30 | A31 | A32 | A33 | A34 | A35 | A36 | | |
| A37 | A38 | A39 | A40 | A41 | A42 | A43 | A44 | A45 | A46 | A47 | A48 | | |
| A49 | A50 | A51 | A52 | A53 | A54 | A55 | A56 | A57 | A58 | A59 | A60 | | |
| A61 | A62 | A63 | A64 | A65 | A66 | A67 | A68 | A69 | A70 | A71 | A72 | | |
| A73 | A74 | A75 | A76 | A77 | A78 | A79 | A80 | A81 | A82 | A83 | A84 | | |

| <u>OH</u> |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| A85 | A86 | A87 | A88 | A89 | A90 | - | - | - | - | - | - | - | - |
| - | - | A99 | A100 | A101 | A102 | A103 | A104 | A105 | A106 | A107 | A108 | | |
| A109 | A110 | A111 | A112 | A113 | A114 | A115 | A116 | A117 | A118 | A119 | A120 | | |
| A121 | A122 | A123 | A124 | A125 | A126 | A127 | A128 | A129 | A130 | A131 | A132 | | |
| A133 | A134 | A135 | A136 | A137 | A138 | A139 | A140 | A141 | A142 | A143 | A144 | | |
| A145 | A146 | A147 | A148 | A149 | A150 | A151 | A152 | A153 | A154 | A155 | A156 | | |
| A157 | A158 | A159 | A160 | A161 | A162 | A163 | A164 | A165 | A166 | A167 | A168 | | |
| A169 | A170 | A171 | A172 | A173 | A174 | A175 | A176 | A177 | A178 | A179 | A180 | | |
| A181 | A182 | A183 | A184 | A185 | A186 | A187 | A188 | A189 | A190 | A191 | A192 | | |
| A193 | A194 | A195 | A196 | A197 | A198 | A199 | A200 | A201 | A202 | A203 | A204 | | |
| A205 | A206 | A207 | A208 | A209 | A210 | A211 | A212 | A213 | A214 | A215 | A216 | | |
| A217 | A218 | A219 | A220 | A221 | A222 | A223 | A224 | A225 | A226 | A227 | A228 | | |
| A229 | A230 | A231 | A232 | A233 | A234 | A235 | A236 | A237 | A238 | A239 | A240 | | |
| A241 | A242 | A243 | A244 | A245 | A246 | A247 | A248 | A249 | A250 | A251 | A252 | | |
| A253 | A254 | A255 | A256 | A257 | A258 | A259 | A260 | A261 | A262 | A263 | A264 | | |
| A265 | A266 | A267 | A268 | A269 | A270 | A271 | A272 | A273 | A274 | A275 | A276 | | |
| A277 | A278 | A279 | A280 | A281 | A282 | A283 | A284 | A285 | A286 | A287 | A288 | | |
| A289 | A290 | A291 | A292 | A293 | A294 | A295 | A296 | A297 | A298 | A299 | A300 | | |
| A301 | A302 | A303 | A304 | A305 | A306 | A307 | A308 | A309 | A310 | A311 | A312 | | |
| A313 | A314 | A315 | A316 | A317 | A318 | A319 | A320 | A321 | A322 | A323 | A324 | | |
| A325 | A326 | A327 | A328 | A329 | A330 | A331 | A332 | A333 | A334 | A335 | A336 | | |
| A337 | A338 | A339 | A340 | A341 | A342 | A343 | A344 | A345 | A346 | A347 | A348 | | |
| A349 | A350 | A351 | A352 | A353 | A354 | A355 | A356 | A357 | A358 | A359 | A360 | | |
| A361 | A362 | A363 | A364 | A365 | A366 | A367 | A368 | A369 | A370 | A371 | A372 | | |
| A373 | A374 | A375 | A376 | A377 | A378 | A379 | A380 | A381 | A382 | A383 | A384 | | |
| A385 | A386 | A387 | A388 | A389 | A390 | A391 | A392 | A393 | A394 | A395 | A396 | | |
| A397 | A398 | A399 | A400 | A401 | A402 | A403 | A404 | A405 | A406 | A407 | A408 | | |
| A409 | A410 | A411 | A412 | A413 | A414 | A415 | A416 | A417 | A418 | A419 | A420 | | |
| A421 | A422 | A423 | A424 | A425 | A426 | A427 | A428 | A429 | A430 | A431 | A432 | | |
| A433 | A434 | A435 | A436 | A437 | A438 | A439 | A440 | A441 | A442 | A443 | A444 | | |
| A445 | A446 | A447 | A448 | A449 | A450 | A451 | A452 | A453 | A454 | A455 | A456 | | |
| A457 | A458 | A459 | A460 | A461 | A462 | A463 | A464 | A465 | A466 | A467 | A468 | | |
| A469 | A470 | A471 | A472 | A473 | A474 | A475 | A476 | A477 | A478 | A479 | A480 | | |

| <u>OH</u> |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| A481 | A482 | A483 | A484 | A485 | A486 | A487 | A488 | A489 | A490 | A491 | A492 | | | |
| A493 | A494 | A495 | A496 | A497 | A498 | A499 | A500 | A501 | A502 | A503 | A504 | | | |
| A505 | A506 | A507 | A508 | A509 | A510 | A511 | A512 | A513 | A514 | A515 | A516 | | | |
| A517 | A518 | A519 | A520 | A521 | A522 | A523 | A524 | A525 | A526 | A527 | A528 | | | |
| A529 | A530 | A531 | A532 | A533 | A534 | A535 | A536 | A537 | A538 | A539 | A540 | | | |
| A541 | A542 | A543 | A544 | A545 | - | - | - | - | - | - | - | | | |
| - | | A554 | A555 | A556 | A557 | A558 | A559 | A560 | A561 | A562 | A563 | A564 | | |
| A565 | A566 | A567 | A568 | A569 | A570 | A571 | A572 | A573 | A574 | A575 | A576 | | | |
| A577 | A578 | A579 | A580 | A581 | A582 | A583 | A584 | A585 | A586 | A587 | A588 | | | |
| A589 | A590 | A591 | A592 | A593 | A594 | A595 | A596 | A597 | A598 | A599 | A600 | | | |
| A601 | A602 | A603 | A604 | A605 | A606 | A607 | A608 | A609 | A610 | A611 | A612 | | | |
| A613 | A614 | A615 | A616 | A617 | A618 | A619 | A620 | A621 | A622 | A623 | A624 | | | |
| A625 | A626 | A627 | A628 | A629 | A630 | A631 | A632 | A633 | A634 | A635 | A636 | | | |
| - | - | - | - | - | - | - | A644 | A645 | A646 | A647 | A648 | | | |
| A649 | A650 | A651 | A652 | A653 | A654 | A655 | A656 | A657 | A658 | A659 | A660 | | | |
| A661 | A662 | A663 | A664 | A665 | A666 | A667 | A668 | A669 | A670 | A671 | A672 | | | |
| A685 | A686 | A687 | A688 | A689 | A690 | A691 | A692 | A693 | A694 | A695 | A696 | | | |
| A697 | A698 | A699 | A700 | A701 | A702 | A703 | A704 | A705 | A706 | A707 | A708 | | | |
| A709 | A710 | A711 | A712 | A713 | A714 | A715 | A716 | A717 | A718 | A719 | A720 | | | |
| A721 | A722 | A723 | A724 | A725 | A726 | - | - | - | - | - | - | | | |
| A733 | A734 | A735 | A736 | A737 | A738 | A739 | A740 | A741 | A742 | A743 | A744 | | | |
| A745 | A746 | A747 | A748 | A749 | A750 | A751 | A752 | A753 | A754 | A755 | A756 | | | |
| A757 | A758 | A759 | A760 | A761 | A762 | A763 | A764 | A765 | A766 | A767 | A768 | | | |
| A769 | A770 | A771 | A772 | A773 | A774 | A775 | A776 | A777 | A778 | A779 | A780 | | | |
| A781 | A782 | A783 | A784 | A785 | A786 | A787 | A788 | A789 | A790 | A791 | A792 | | | |
| A793 | A794 | A795 | A796 | A797 | A798 | A799 | A800 | A801 | A802 | A803 | A804 | | | |
| A805 | A806 | A807 | A808 | A809 | A810 | A811 | A812 | A813 | A814 | A815 | A816 | | | |
| A817 | A818 | A819 | A820 | A821 | A822 | A823 | A824 | A825 | A826 | A827 | A828 | | | |
| A829 | A830 | A831 | A832 | - | - | - | - | - | - | - | - | | | |

Table 2: Compounds of the formula I, represented as compounds of the formula

A-Q

in which Q denotes Q₁ and Q₁ denotes the radical B52:

| <u>B52</u> |
|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| A1 | A2 | A3 | A4 | A5 | A6 | A7 | A8 | A9 | A10 | A11 | A12 | |
| A13 | A14 | A15 | A16 | A17 | A18 | A19 | A20 | A21 | A22 | A23 | A24 | |
| A25 | A26 | A27 | A28 | A29 | A30 | A31 | A32 | A33 | A34 | A35 | A36 | |
| A37 | A38 | A39 | A40 | A41 | A42 | A43 | A44 | A45 | A46 | A47 | A48 | |
| A49 | A50 | A51 | A52 | A53 | A54 | A55 | A56 | A57 | A58 | A59 | A60 | |
| A61 | A62 | A63 | A64 | A65 | A66 | A67 | A68 | A69 | A70 | A71 | A72 | |
| A73 | A74 | A75 | A76 | A77 | A78 | A79 | A80 | A81 | A82 | A83 | A84 | |
| A85 | A86 | A87 | A88 | A89 | A90 | A91 | A92 | A93 | A94 | A95 | A96 | |
| A97 | A98 | A99 | A100 | A101 | A102 | A103 | A104 | A105 | A106 | A107 | A108 | |
| A109 | A110 | A111 | A112 | A113 | A114 | A115 | A116 | A117 | A118 | A119 | A120 | |
| A121 | A122 | A123 | A124 | A125 | A126 | A127 | A128 | A129 | A130 | A131 | A132 | |
| A133 | A134 | A135 | A136 | A137 | A138 | A139 | A140 | A141 | A142 | A143 | A144 | |
| A145 | A146 | A147 | A148 | A149 | A150 | A151 | A152 | A153 | A154 | A155 | A156 | |
| A157 | A158 | A159 | A160 | A161 | A162 | A163 | A164 | A165 | A166 | A167 | A168 | |
| A169 | A170 | A171 | A172 | A173 | A174 | A175 | A176 | A177 | A178 | A179 | A180 | |
| A181 | A182 | A183 | A184 | A185 | A186 | A187 | A188 | A189 | A190 | A191 | A192 | |
| A193 | A194 | A195 | A196 | A197 | A198 | A199 | A200 | A201 | A202 | A203 | A204 | |
| A205 | A206 | A207 | A208 | A209 | A210 | A211 | A212 | A213 | A214 | A215 | A216 | |
| A217 | A218 | A219 | A220 | A221 | A222 | A223 | A224 | A225 | A226 | A227 | A228 | |
| A229 | A230 | A231 | A232 | A233 | A234 | A235 | A236 | A237 | A238 | A239 | A240 | |
| A241 | A242 | A243 | A244 | A245 | A246 | A247 | A248 | A249 | A250 | A251 | A252 | |
| A253 | A254 | A255 | A256 | A257 | A258 | A259 | A260 | A261 | A262 | A263 | A264 | |
| A265 | A266 | A267 | A268 | A269 | A270 | A271 | A272 | A273 | A274 | A275 | A276 | |
| A277 | A278 | A279 | A280 | A281 | A282 | A283 | A284 | A285 | A286 | A287 | A288 | |
| A289 | A290 | A291 | A292 | A293 | A294 | A295 | A296 | A297 | A298 | A299 | A300 | |
| A301 | A302 | A303 | A304 | A305 | A306 | A307 | A308 | A309 | A310 | A311 | A312 | |
| A313 | A314 | A315 | A316 | A317 | A318 | A319 | A320 | A321 | A322 | A323 | A324 | |

| <u>B52</u> |
|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| A325 | A326 | A327 | A328 | A329 | A330 | A331 | A332 | A333 | A334 | A335 | A336 | | |
| A337 | A338 | A339 | A340 | A341 | A342 | A343 | A344 | A345 | A346 | A347 | A348 | | |
| A349 | A350 | A351 | A352 | A353 | A354 | A355 | A356 | A357 | A358 | A359 | A360 | | |
| A361 | A362 | A363 | A364 | A365 | A366 | A367 | A368 | A369 | A370 | A371 | A372 | | |
| A373 | A374 | A375 | A376 | A377 | A378 | A379 | A380 | A381 | A382 | A383 | A384 | | |
| A385 | A386 | A387 | A388 | A389 | A390 | A391 | A392 | A393 | A394 | A395 | A396 | | |
| A397 | A398 | A399 | A400 | A401 | A402 | A403 | A404 | A405 | A406 | A407 | A408 | | |
| A409 | A410 | A411 | A412 | A413 | A414 | A415 | A416 | A417 | A418 | A419 | A420 | | |
| A421 | A422 | A423 | A424 | A425 | A426 | A427 | A428 | A429 | A430 | A431 | A432 | | |
| A433 | A434 | A435 | A436 | A437 | A438 | A439 | A440 | A441 | A442 | A443 | A444 | | |
| A445 | A446 | A447 | A448 | A449 | A450 | A451 | A452 | A453 | A454 | A455 | A456 | | |
| A457 | A458 | A459 | A460 | A461 | A462 | A463 | A464 | A465 | A466 | A467 | A468 | | |
| A469 | A470 | A471 | A472 | A473 | A474 | A475 | A476 | A477 | A478 | A479 | A480 | | |
| A481 | A482 | A483 | A484 | A485 | A486 | A487 | A488 | A489 | A490 | A491 | A492 | | |
| A493 | A494 | A495 | A496 | A497 | A498 | A499 | A500 | A501 | A502 | A503 | A504 | | |
| A505 | A506 | A507 | A508 | A509 | A510 | A511 | A512 | A513 | A514 | A515 | A516 | | |
| A517 | A518 | A519 | A520 | A521 | A522 | A523 | A524 | A525 | A526 | A527 | A528 | | |
| A529 | A530 | A531 | A532 | A533 | A534 | A535 | A536 | A537 | A538 | A539 | A540 | | |
| A541 | A542 | A543 | A544 | A545 | A546 | A547 | A548 | A549 | A550 | A551 | A552 | | |
| A553 | A554 | A555 | A556 | A557 | A558 | A559 | A560 | A561 | A562 | A563 | A564 | | |
| A565 | A566 | A567 | A568 | A569 | A570 | A571 | A572 | A573 | A574 | A575 | A576 | | |
| A577 | A578 | A579 | A580 | A581 | A582 | A583 | A584 | A585 | A586 | A587 | A588 | | |
| A589 | A590 | A591 | A592 | A593 | A594 | A595 | A596 | A597 | A598 | A599 | A600 | | |
| A601 | A602 | A603 | A604 | A605 | A606 | A607 | A608 | A609 | A610 | A611 | A612 | | |
| A613 | A614 | A615 | A616 | A617 | A618 | A619 | A620 | A621 | A622 | A623 | A624 | | |
| A625 | A626 | A627 | A628 | A629 | A630 | A631 | A632 | A633 | A634 | A635 | A636 | | |
| A637 | A638 | A639 | A640 | A641 | A642 | A643 | A644 | A645 | A646 | A647 | A648 | | |
| A649 | A650 | A651 | A652 | A653 | A654 | A655 | A656 | A657 | A658 | A659 | A660 | | |
| A661 | A662 | A663 | A664 | A665 | A666 | A667 | A668 | A669 | A670 | A671 | A672 | | |
| A673 | A674 | A675 | A676 | A677 | A678 | A679 | A680 | A681 | A682 | A683 | A684 | | |
| A685 | A686 | A687 | A688 | A689 | A690 | A691 | A692 | A693 | A694 | A695 | A696 | | |
| A697 | A698 | A699 | A700 | A701 | A702 | A703 | A704 | A705 | A706 | A707 | A708 | | |
| A709 | A710 | A711 | A712 | A713 | A714 | A715 | A716 | A717 | A718 | A719 | A720 | | |

| <u>B52</u> |
|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| A721 | A722 | A723 | A724 | A725 | A726 | A727 | A728 | A729 | A730 | A731 | A732 | | |
| A733 | A734 | A735 | A736 | A737 | A738 | A739 | A740 | A741 | A742 | A743 | A744 | | |
| A745 | A746 | A747 | A748 | A749 | A750 | A751 | A752 | A753 | A754 | A755 | A756 | | |
| A757 | A758 | A759 | A760 | A761 | A762 | A763 | A764 | A765 | A766 | A767 | A768 | | |
| A769 | A770 | A771 | A772 | A773 | A774 | A775 | A776 | A777 | A778 | A779 | A780 | | |
| A781 | A782 | A783 | A784 | A785 | A786 | A787 | A788 | A789 | A790 | A791 | A792 | | |
| A793 | A794 | A795 | A796 | A797 | A798 | A799 | A800 | A801 | A802 | A803 | A804 | | |
| A805 | A806 | A807 | A808 | A809 | A810 | A811 | A812 | A813 | A814 | A815 | A816 | | |
| A817 | A818 | A819 | A820 | A821 | A822 | A823 | A824 | A825 | A826 | A827 | A828 | | |
| A829 | A830 | A831 | A832 | - | - | - | - | - | - | - | - | | |

Table 3: Compounds of the formula I, represented as compounds of the formula

A-Q

in which Q denotes Q₁ and Q₁ denotes the radical B39:

| <u>B39</u> |
|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| A1 | A2 | A3 | A4 | A5 | A6 | A7 | A8 | A9 | A10 | A11 | A12 | | |
| A13 | A14 | A15 | A16 | A17 | A18 | A19 | A20 | A21 | A22 | A23 | A24 | | |
| A25 | A26 | A27 | A28 | A29 | A30 | A31 | A32 | A33 | A34 | A35 | A36 | | |
| A37 | A38 | A39 | A40 | A41 | A42 | A43 | A44 | A45 | A46 | A47 | A48 | | |
| A49 | A50 | A51 | A52 | A53 | A54 | A55 | A56 | A57 | A58 | A59 | A60 | | |
| A61 | A62 | A63 | A64 | A65 | A66 | A67 | A68 | A69 | A70 | A71 | A72 | | |
| A73 | A74 | A75 | A76 | A77 | A78 | A79 | A80 | A81 | A82 | A83 | A84 | | |
| A85 | A86 | A87 | A88 | A89 | A90 | A91 | A92 | A93 | A94 | A95 | A96 | | |
| A97 | A98 | A99 | A100 | A101 | A102 | A103 | A104 | A105 | A106 | A107 | A108 | | |
| A109 | A110 | A111 | A112 | A113 | A114 | A115 | A116 | A117 | A118 | A119 | A120 | | |
| A121 | A122 | A123 | A124 | A125 | A126 | A127 | A128 | A129 | A130 | A131 | A132 | | |
| A133 | A134 | A135 | A136 | A137 | A138 | A139 | A140 | A141 | A142 | A143 | A144 | | |
| A145 | A146 | A147 | A148 | A149 | A150 | A151 | A152 | A153 | A154 | A155 | A156 | | |

| <u>B39</u> |
|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| A157 | A158 | A159 | A160 | A161 | A162 | A163 | A164 | A165 | A166 | A167 | A168 | | |
| A169 | A170 | A171 | A172 | A173 | A174 | A175 | A176 | A177 | A178 | A179 | A180 | | |
| A181 | A182 | A183 | A184 | A185 | A186 | A187 | A188 | A189 | A190 | A191 | A192 | | |
| A193 | A194 | A195 | A196 | A197 | A198 | A199 | A200 | A201 | A202 | A203 | A204 | | |
| A205 | A206 | A207 | A208 | A209 | A210 | A211 | A212 | A213 | A214 | A215 | A216 | | |
| A217 | A218 | A219 | A220 | A221 | A222 | A223 | A224 | A225 | A226 | A227 | A228 | | |
| A229 | A230 | A231 | A232 | A233 | A234 | A235 | A236 | A237 | A238 | A239 | A240 | | |
| A241 | A242 | A243 | A244 | A245 | A246 | A247 | A248 | A249 | A250 | A251 | A252 | | |
| A253 | A254 | A255 | A256 | A257 | A258 | A259 | A260 | A261 | A262 | A263 | A264 | | |
| A265 | A266 | A267 | A268 | A269 | A270 | A271 | A272 | A273 | A274 | A275 | A276 | | |
| A277 | A278 | A279 | A280 | A281 | A282 | A283 | A284 | A285 | A286 | A287 | A288 | | |
| A289 | A290 | A291 | A292 | A293 | A294 | A295 | A296 | A297 | A298 | A299 | A300 | | |
| A301 | A302 | A303 | A304 | A305 | A306 | A307 | A308 | A309 | A310 | A311 | A312 | | |
| A313 | A314 | A315 | A316 | A317 | A318 | A319 | A320 | A321 | A322 | A323 | A324 | | |
| A325 | A326 | A327 | A328 | A329 | A330 | A331 | A332 | A333 | A334 | A335 | A336 | | |
| A337 | A338 | A339 | A340 | A341 | A342 | A343 | A344 | A345 | A346 | A347 | A348 | | |
| A349 | A350 | A351 | A352 | A353 | A354 | A355 | A356 | A357 | A358 | A359 | A360 | | |
| A361 | A362 | A363 | A364 | A365 | A366 | A367 | A368 | A369 | A370 | A371 | A372 | | |
| A373 | A374 | A375 | A376 | A377 | A378 | A379 | A380 | A381 | A382 | A383 | A384 | | |
| A385 | A386 | A387 | A388 | A389 | A390 | A391 | A392 | A393 | A394 | A395 | A396 | | |
| A397 | A398 | A399 | A400 | A401 | A402 | A403 | A404 | A405 | A406 | A407 | A408 | | |
| A409 | A410 | A411 | A412 | A413 | A414 | A415 | A416 | A417 | A418 | A419 | A420 | | |
| A421 | A422 | A423 | A424 | A425 | A426 | A427 | A428 | A429 | A430 | A431 | A432 | | |
| A433 | A434 | A435 | A436 | A437 | A438 | A439 | A440 | A441 | A442 | A443 | A444 | | |
| A445 | A446 | A447 | A448 | A449 | A450 | A451 | A452 | A453 | A454 | A455 | A456 | | |
| A457 | A458 | A459 | A460 | A461 | A462 | A463 | A464 | A465 | A466 | A467 | A468 | | |
| A469 | A470 | A471 | A472 | A473 | A474 | A475 | A476 | A477 | A478 | A479 | A480 | | |
| A481 | A482 | A483 | A484 | A485 | A486 | A487 | A488 | A489 | A490 | A491 | A492 | | |
| A493 | A494 | A495 | A496 | A497 | A498 | A499 | A500 | A501 | A502 | A503 | A504 | | |
| A505 | A506 | A507 | A508 | A509 | A510 | A511 | A512 | A513 | A514 | A515 | A516 | | |
| A517 | A518 | A519 | A520 | A521 | A522 | A523 | A524 | A525 | A526 | A527 | A528 | | |
| A529 | A530 | A531 | A532 | A533 | A534 | A535 | A536 | A537 | A538 | A539 | A540 | | |
| A541 | A542 | A543 | A544 | A545 | A546 | A547 | A548 | A549 | A550 | A551 | A552 | | |

Table 4: Compounds of the formula I, represented as compounds of the formula

A-Q

in which Q denotes Q_1 and Q_1 denotes the radical B3:

| <u>B3</u> |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| - | - | - | - | - | - | - | A8 | A9 | A10 | A11 | A12 | |
| A13 | A14 | A15 | A16 | A17 | A18 | A19 | A20 | A21 | A22 | A23 | A24 | |
| A25 | A26 | A27 | A28 | A29 | A30 | A31 | A32 | A33 | A34 | A35 | A36 | |
| A37 | A38 | A39 | A40 | A41 | A42 | A43 | A44 | A45 | A46 | A47 | A48 | |
| A49 | A50 | A51 | A52 | A53 | A54 | A55 | A56 | A57 | A58 | A59 | A60 | |
| A61 | A62 | A63 | A64 | A65 | A66 | A67 | A68 | A69 | A70 | A71 | A72 | |
| A73 | A74 | A75 | A76 | A77 | A78 | A79 | A80 | A81 | A82 | A83 | A84 | |
| A85 | A86 | A87 | A88 | A89 | A90 | - | - | - | - | - | - | |
| - | - | A99 | A100 | A101 | A102 | A103 | A104 | A105 | A106 | A107 | A108 | |
| A109 | A110 | A111 | A112 | A113 | A114 | A115 | A116 | A117 | A118 | A119 | A120 | |
| A121 | A122 | A123 | A124 | A125 | A126 | A127 | A128 | A129 | A130 | A131 | A132 | |
| A133 | A134 | A135 | A136 | A137 | A138 | A139 | A140 | A141 | A142 | A143 | A144 | |
| A145 | A146 | A147 | A148 | A149 | A150 | A151 | A152 | A153 | A154 | A155 | A156 | |
| A157 | A158 | A159 | A160 | A161 | A162 | A163 | A164 | A165 | A166 | A167 | A168 | |
| A169 | A170 | A171 | A172 | A173 | A174 | A175 | A176 | A177 | A178 | A179 | A180 | |
| A181 | A182 | A183 | A184 | A185 | A186 | A187 | A188 | A189 | A190 | A191 | A192 | |
| A193 | A194 | A195 | A196 | A197 | A198 | A199 | A200 | A201 | A202 | A203 | A204 | |
| A205 | A206 | A207 | A208 | A209 | A210 | A211 | A212 | A213 | A214 | A215 | A216 | |
| A217 | A218 | A219 | A220 | A221 | A222 | A223 | A224 | A225 | A226 | A227 | A228 | |
| A229 | A230 | A231 | A232 | A233 | A234 | A235 | A236 | A237 | A238 | A239 | A240 | |
| A241 | A242 | A243 | A244 | A245 | A246 | A247 | A248 | A249 | A250 | A251 | A252 | |
| A253 | A254 | A255 | A256 | A257 | A258 | A259 | A260 | A261 | A262 | A263 | A264 | |
| A265 | A266 | A267 | A268 | A269 | A270 | A271 | A272 | A273 | A274 | A275 | A276 | |
| A277 | A278 | A279 | A280 | A281 | A282 | A283 | A284 | A285 | A286 | A287 | A288 | |
| A289 | A290 | A291 | A292 | A293 | A294 | A295 | A296 | A297 | A298 | A299 | A300 | |
| A301 | A302 | A303 | A304 | A305 | A306 | A307 | A308 | A309 | A310 | A311 | A312 | |
| A313 | A314 | A315 | A316 | A317 | A318 | A319 | A320 | A321 | A322 | A323 | A324 | |
| A325 | A326 | A327 | A328 | A329 | A330 | A331 | A332 | A333 | A334 | A335 | A336 | |
| A337 | A338 | A339 | A340 | A341 | A342 | A343 | A344 | A345 | A346 | A347 | A348 | |
| A349 | A350 | A351 | A352 | A353 | A354 | A355 | A356 | A357 | A358 | A359 | A360 | |
| A361 | A362 | A363 | A364 | A365 | A366 | A367 | A368 | A369 | A370 | A371 | A372 | |
| A373 | A374 | A375 | A376 | A377 | A378 | A379 | A380 | A381 | A382 | A383 | A384 | |

| <u>B3</u> |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| A385 | A386 | A387 | A388 | A389 | A390 | A391 | A392 | A393 | A394 | A395 | A396 | | |
| A397 | A398 | A399 | A400 | A401 | A402 | A403 | A404 | A405 | A406 | A407 | A408 | | |
| A409 | A410 | A411 | A412 | A413 | A414 | A415 | A416 | A417 | A418 | A419 | A420 | | |
| A421 | A422 | A423 | A424 | A425 | A426 | A427 | A428 | A429 | A430 | A431 | A432 | | |
| A433 | A434 | A435 | A436 | A437 | A438 | A439 | A440 | A441 | A442 | A443 | A444 | | |
| A445 | A446 | A447 | A448 | A449 | A450 | A451 | A452 | A453 | A454 | A455 | A456 | | |
| A457 | A458 | A459 | A460 | A461 | A462 | A463 | A464 | A465 | A466 | A467 | A468 | | |
| A469 | A470 | A471 | A472 | A473 | A474 | A475 | A476 | A477 | A478 | A479 | A480 | | |
| A481 | A482 | A483 | A484 | A485 | A486 | A487 | A488 | A489 | A490 | A491 | A492 | | |
| A493 | A494 | A495 | A496 | A497 | A498 | A499 | A500 | A501 | A502 | A503 | A504 | | |
| A505 | A506 | A507 | A508 | A509 | A510 | A511 | A512 | A513 | A514 | A515 | A516 | | |
| A517 | A518 | A519 | A520 | A521 | A522 | A523 | A524 | A525 | A526 | A527 | A528 | | |
| A529 | A530 | A531 | A532 | A533 | A534 | A535 | A536 | A537 | A538 | A539 | A540 | | |
| A541 | A542 | A543 | A544 | A545 | - | - | - | - | - | - | - | | |
| - | A554 | A555 | A556 | A557 | A558 | A559 | A560 | A561 | A562 | A563 | A564 | | |
| A565 | A566 | A567 | A568 | A569 | A570 | A571 | A572 | A573 | A574 | A575 | A576 | | |
| A577 | A578 | A579 | A580 | A581 | A582 | A583 | A584 | A585 | A586 | A587 | A588 | | |
| A589 | A590 | A591 | A592 | A593 | A594 | A595 | A596 | A597 | A598 | A599 | A600 | | |
| A601 | A602 | A603 | A604 | A605 | A606 | A607 | A608 | A609 | A610 | A611 | A612 | | |
| A613 | A614 | A615 | A616 | A617 | A618 | A619 | A620 | A621 | A622 | A623 | A624 | | |
| A625 | A626 | A627 | A628 | A629 | A630 | A631 | A632 | A633 | A634 | A635 | A636 | | |
| - | - | - | - | - | - | - | A644 | A645 | A646 | A647 | A648 | | |
| A649 | A650 | A651 | A652 | A653 | A654 | A655 | A656 | A657 | A658 | A659 | A660 | | |
| A661 | A662 | A663 | A664 | A665 | A666 | A667 | A668 | A669 | A670 | A671 | A672 | | |
| A685 | A686 | A687 | A688 | A689 | A690 | A691 | A692 | A693 | A694 | A695 | A696 | | |
| A697 | A698 | A699 | A700 | A701 | A702 | A703 | A704 | A705 | A706 | A707 | A708 | | |
| A709 | A710 | A711 | A712 | A713 | A714 | A715 | A716 | A717 | A718 | A719 | A720 | | |
| A721 | A722 | A723 | A724 | A725 | A726 | - | - | - | - | - | - | | |
| A733 | A734 | A735 | A736 | A737 | A738 | A739 | A740 | A741 | A742 | A743 | A744 | | |
| A745 | A746 | A747 | A748 | A749 | A750 | A751 | A752 | A753 | A754 | A755 | A756 | | |
| A757 | A758 | A759 | A760 | A761 | A762 | A763 | A764 | A765 | A766 | A767 | A768 | | |
| A769 | A770 | A771 | A772 | A773 | A774 | A775 | A776 | A777 | A778 | A779 | A780 | | |
| A781 | A782 | A783 | A784 | A785 | A786 | A787 | A788 | A789 | A790 | A791 | A792 | | |

| <u>B3</u> |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| A793 | A794 | A795 | A796 | A797 | A798 | A799 | A800 | A801 | A802 | A803 | A804 | | |
| A805 | A806 | A807 | A808 | A809 | A810 | A811 | A812 | A813 | A814 | A815 | A816 | | |
| A817 | A818 | A819 | A820 | A821 | A822 | A823 | A824 | A825 | A826 | A827 | A828 | | |
| A829 | A830 | A831 | A832 | - | - | - | - | - | - | - | - | | |

Table 5: Compounds of the formula I, represented as compounds of the formula

A-Qin which Q denotes Q₂ and Q₂ denotes the radical C5:

| <u>C5</u> |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| A1 | A2 | A3 | A4 | A5 | A6 | A7 | A8 | A9 | A10 | A11 | A12 | | |
| A13 | A14 | A15 | A16 | A17 | A18 | A19 | A20 | A21 | A22 | A23 | A24 | | |
| A25 | A26 | A27 | A28 | A29 | A30 | A31 | A32 | A33 | A34 | A35 | A36 | | |
| A37 | A38 | A39 | A40 | A41 | A42 | A43 | A44 | A45 | A46 | A47 | A48 | | |
| A49 | A50 | A51 | A52 | A53 | A54 | A55 | A56 | A57 | A58 | A59 | A60 | | |
| A61 | A62 | A63 | A64 | A65 | A66 | A67 | A68 | A69 | A70 | A71 | A72 | | |
| A73 | A74 | A75 | A76 | A77 | A78 | A79 | A80 | A81 | A82 | A83 | A84 | | |
| A85 | A86 | A87 | A88 | A89 | A90 | A91 | A92 | A93 | A94 | A95 | A96 | | |
| A97 | A98 | A99 | A100 | A101 | A102 | A103 | A104 | A105 | A106 | A107 | A108 | | |
| A109 | A110 | A111 | A112 | A113 | A114 | A115 | A116 | A117 | A118 | A119 | A120 | | |
| A121 | A122 | A123 | A124 | A125 | A126 | A127 | A128 | A129 | A130 | A131 | A132 | | |
| A133 | A134 | A135 | A136 | A137 | A138 | A139 | A140 | A141 | A142 | A143 | A144 | | |
| A145 | A146 | A147 | A148 | A149 | A150 | A151 | A152 | A153 | A154 | A155 | A156 | | |
| A157 | A158 | A159 | A160 | A161 | A162 | A163 | A164 | A165 | A166 | A167 | A168 | | |
| A169 | A170 | A171 | A172 | A173 | A174 | A175 | A176 | A177 | A178 | A179 | A180 | | |
| A181 | A182 | A183 | A184 | A185 | A186 | A187 | A188 | A189 | A190 | A191 | A192 | | |
| A193 | A194 | A195 | A196 | A197 | A198 | A199 | A200 | A201 | A202 | A203 | A204 | | |
| A205 | A206 | A207 | A208 | A209 | A210 | A211 | A212 | A213 | A214 | A215 | A216 | | |
| A217 | A218 | A219 | A220 | A221 | A222 | A223 | A224 | A225 | A226 | A227 | A228 | | |

| <u>C5</u> |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| A229 | A230 | A231 | A232 | A233 | A234 | A235 | A236 | A237 | A238 | A239 | A240 | | | |
| A241 | A242 | A243 | A244 | A245 | A246 | A247 | A248 | A249 | A250 | A251 | A252 | | | |
| A253 | A254 | A255 | A256 | A257 | A258 | A259 | A260 | A261 | A262 | A263 | A264 | | | |
| A265 | A266 | A267 | A268 | A269 | A270 | A271 | A272 | A273 | A274 | A275 | A276 | | | |
| A277 | A278 | A279 | A280 | A281 | A282 | A283 | A284 | A285 | A286 | A287 | A288 | | | |
| A289 | A290 | A291 | A292 | A293 | A294 | A295 | A296 | A297 | A298 | A299 | A300 | | | |
| A301 | A302 | A303 | A304 | A305 | A306 | A307 | A308 | A309 | A310 | A311 | A312 | | | |
| A313 | A314 | A315 | A316 | A317 | A318 | A319 | A320 | A321 | A322 | A323 | A324 | | | |
| A325 | A326 | A327 | A328 | A329 | A330 | A331 | A332 | A333 | A334 | A335 | A336 | | | |
| A337 | A338 | A339 | A340 | A341 | A342 | A343 | A344 | A345 | A346 | A347 | A348 | | | |
| A349 | A350 | A351 | A352 | A353 | A354 | A355 | A356 | A357 | A358 | A359 | A360 | | | |
| A361 | A362 | A363 | A364 | A365 | A366 | A367 | A368 | A369 | A370 | A371 | A372 | | | |
| A373 | A374 | A375 | A376 | A377 | A378 | A379 | A380 | A381 | A382 | A383 | A384 | | | |
| A385 | A386 | A387 | A388 | A389 | A390 | A391 | A392 | A393 | A394 | A395 | A396 | | | |
| A397 | A398 | A399 | A400 | A401 | A402 | A403 | A404 | A405 | A406 | A407 | A408 | | | |
| A409 | A410 | A411 | A412 | A413 | A414 | A415 | A416 | A417 | A418 | A419 | A420 | | | |
| A421 | A422 | A423 | A424 | A425 | A426 | A427 | A428 | A429 | A430 | A431 | A432 | | | |
| A433 | A434 | A435 | A436 | A437 | A438 | A439 | A440 | A441 | A442 | A443 | A444 | | | |
| A445 | A446 | A447 | A448 | A449 | A450 | A451 | A452 | A453 | A454 | A455 | A456 | | | |
| A457 | A458 | A459 | A460 | A461 | A462 | A463 | A464 | A465 | A466 | A467 | A468 | | | |
| A469 | A470 | A471 | A472 | A473 | A474 | A475 | A476 | A477 | A478 | A479 | A480 | | | |
| A481 | A482 | A483 | A484 | A485 | A486 | A487 | A488 | A489 | A490 | A491 | A492 | | | |
| A493 | A494 | A495 | A496 | A497 | A498 | A499 | A500 | A501 | A502 | A503 | A504 | | | |
| A505 | A506 | A507 | A508 | A509 | A510 | A511 | A512 | A513 | A514 | A515 | A516 | | | |
| A517 | A518 | A519 | A520 | A521 | A522 | A523 | A524 | A525 | A526 | A527 | A528 | | | |
| A529 | A530 | A531 | A532 | A533 | A534 | A535 | A536 | A537 | A538 | A539 | A540 | | | |
| A541 | A542 | A543 | A544 | A545 | A546 | A547 | A548 | A549 | A550 | A551 | A552 | | | |
| A553 | A554 | A555 | A556 | A557 | A558 | A559 | A560 | A561 | A562 | A563 | A564 | | | |
| A565 | A566 | A567 | A568 | A569 | A570 | A571 | A572 | A573 | A574 | A575 | A576 | | | |
| A577 | A578 | A579 | A580 | A581 | A582 | A583 | A584 | A585 | A586 | A587 | A588 | | | |
| A589 | A590 | A591 | A592 | A593 | A594 | A595 | A596 | A597 | A598 | A599 | A600 | | | |
| A601 | A602 | A603 | A604 | A605 | A606 | A607 | A608 | A609 | A610 | A611 | A612 | | | |
| A613 | A614 | A615 | A616 | A617 | A618 | A619 | A620 | A621 | A622 | A623 | A624 | | | |

| <u>C5</u> |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| A625 | A626 | A627 | A628 | A629 | A630 | A631 | A632 | A633 | A634 | A635 | A636 | | |
| A637 | A638 | A639 | A640 | A641 | A642 | A643 | A644 | A645 | A646 | A647 | A648 | | |
| A649 | A650 | A651 | A652 | A653 | A654 | A655 | A656 | A657 | A658 | A659 | A660 | | |
| A661 | A662 | A663 | A664 | A665 | A666 | A667 | A668 | A669 | A670 | A671 | A672 | | |
| A673 | A674 | A675 | A676 | A677 | A678 | A679 | A680 | A681 | A682 | A683 | A684 | | |
| A685 | A686 | A687 | A688 | A689 | A690 | A691 | A692 | A693 | A694 | A695 | A696 | | |
| A697 | A698 | A699 | A700 | A701 | A702 | A703 | A704 | A705 | A706 | A707 | A708 | | |
| A709 | A710 | A711 | A712 | A713 | A714 | A715 | A716 | A717 | A718 | A719 | A720 | | |
| A721 | A722 | A723 | A724 | A725 | A726 | A727 | A728 | A729 | A730 | A731 | A732 | | |
| A733 | A734 | A735 | A736 | A737 | A738 | A739 | A740 | A741 | A742 | A743 | A744 | | |
| A745 | A746 | A747 | A748 | A749 | A750 | A751 | A752 | A753 | A754 | A755 | A756 | | |
| A757 | A758 | A759 | A760 | A761 | A762 | A763 | A764 | A765 | A766 | A767 | A768 | | |
| A769 | A770 | A771 | A772 | A773 | A774 | A775 | A776 | A777 | A778 | A779 | A780 | | |
| A781 | A782 | A783 | A784 | A785 | A786 | A787 | A788 | A789 | A790 | A791 | A792 | | |
| A793 | A794 | A795 | A796 | A797 | A798 | A799 | A800 | A801 | A802 | A803 | A804 | | |
| A805 | A806 | A807 | A808 | A809 | A810 | A811 | A812 | A813 | A814 | A815 | A816 | | |
| A817 | A818 | A819 | A820 | A821 | A822 | A823 | A824 | A825 | A826 | A827 | A828 | | |
| A829 | A830 | A831 | A832 | - | - | - | - | - | - | - | - | | |

Table 6: Compounds of the formula I, represented as compounds of the formula

A-Qin which Q denotes Q₂ and Q₂ denotes the radical C2:

| <u>C2</u> |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| A1 | A2 | A3 | A4 | A5 | A6 | A7 | A8 | A9 | A10 | A11 | A12 | | |
| A13 | A14 | A15 | A16 | A17 | A18 | A19 | A20 | A21 | A22 | A23 | A24 | | |
| A25 | A26 | A27 | A28 | A29 | A30 | A31 | A32 | A33 | A34 | A35 | A36 | | |
| A37 | A38 | A39 | A40 | A41 | A42 | A43 | A44 | A45 | A46 | A47 | A48 | | |
| A49 | A50 | A51 | A52 | A53 | A54 | A55 | A56 | A57 | A58 | A59 | A60 | | |

| <u>C2</u> |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| A61 | A62 | A63 | A64 | A65 | A66 | A67 | A68 | A69 | A70 | A71 | A72 | |
| A73 | A74 | A75 | A76 | A77 | A78 | A79 | A80 | A81 | A82 | A83 | A84 | |
| A85 | A86 | A87 | A88 | A89 | A90 | A91 | A92 | A93 | A94 | A95 | A96 | |
| A97 | A98 | A99 | A100 | A101 | A102 | A103 | A104 | A105 | A106 | A107 | A108 | |
| A109 | A110 | A111 | A112 | A113 | A114 | A115 | A116 | A117 | A118 | A119 | A120 | |
| A121 | A122 | A123 | A124 | A125 | A126 | A127 | A128 | A129 | A130 | A131 | A132 | |
| A133 | A134 | A135 | A136 | A137 | A138 | A139 | A140 | A141 | A142 | A143 | A144 | |
| A145 | A146 | A147 | A148 | A149 | A150 | A151 | A152 | A153 | A154 | A155 | A156 | |
| A157 | A158 | A159 | A160 | A161 | A162 | A163 | A164 | A165 | A166 | A167 | A168 | |
| A169 | A170 | A171 | A172 | A173 | A174 | A175 | A176 | A177 | A178 | A179 | A180 | |
| A181 | A182 | A183 | A184 | A185 | A186 | A187 | A188 | A189 | A190 | A191 | A192 | |
| A193 | A194 | A195 | A196 | A197 | A198 | A199 | A200 | A201 | A202 | A203 | A204 | |
| A205 | A206 | A207 | A208 | A209 | A210 | A211 | A212 | A213 | A214 | A215 | A216 | |
| A217 | A218 | A219 | A220 | A221 | A222 | A223 | A224 | A225 | A226 | A227 | A228 | |
| A229 | A230 | A231 | A232 | A233 | A234 | A235 | A236 | A237 | A238 | A239 | A240 | |
| A241 | A242 | A243 | A244 | A245 | A246 | A247 | A248 | A249 | A250 | A251 | A252 | |
| A253 | A254 | A255 | A256 | A257 | A258 | A259 | A260 | A261 | A262 | A263 | A264 | |
| A265 | A266 | A267 | A268 | A269 | A270 | A271 | A272 | A273 | A274 | A275 | A276 | |
| A277 | A278 | A279 | A280 | A281 | A282 | A283 | A284 | A285 | A286 | A287 | A288 | |
| A289 | A290 | A291 | A292 | A293 | A294 | A295 | A296 | A297 | A298 | A299 | A300 | |
| A301 | A302 | A303 | A304 | A305 | A306 | A307 | A308 | A309 | A310 | A311 | A312 | |
| A313 | A314 | A315 | A316 | A317 | A318 | A319 | A320 | A321 | A322 | A323 | A324 | |
| A325 | A326 | A327 | A328 | A329 | A330 | A331 | A332 | A333 | A334 | A335 | A336 | |
| A337 | A338 | A339 | A340 | A341 | A342 | A343 | A344 | A345 | A346 | A347 | A348 | |
| A349 | A350 | A351 | A352 | A353 | A354 | A355 | A356 | A357 | A358 | A359 | A360 | |
| A361 | A362 | A363 | A364 | A365 | A366 | A367 | A368 | A369 | A370 | A371 | A372 | |
| A373 | A374 | A375 | A376 | A377 | A378 | A379 | A380 | A381 | A382 | A383 | A384 | |
| A385 | A386 | A387 | A388 | A389 | A390 | A391 | A392 | A393 | A394 | A395 | A396 | |
| A397 | A398 | A399 | A400 | A401 | A402 | A403 | A404 | A405 | A406 | A407 | A408 | |
| A409 | A410 | A411 | A412 | A413 | A414 | A415 | A416 | A417 | A418 | A419 | A420 | |
| A421 | A422 | A423 | A424 | A425 | A426 | A427 | A428 | A429 | A430 | A431 | A432 | |
| A433 | A434 | A435 | A436 | A437 | A438 | A439 | A440 | A441 | A442 | A443 | A444 | |
| A445 | A446 | A447 | A448 | A449 | A450 | A451 | A452 | A453 | A454 | A455 | A456 | |

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Table 7: Compounds of the formula I, represented as compounds of the formula

A-Q

in which Q denotes Q₂ and Q₂ denotes the radicals D1, D2 or D3:

| D1/D2/ D3 |
|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| - | - | - | - | - | - | - | A8 | A9 | A10 | A11 | A12 | |
| A13 | A14 | A15 | A16 | A17 | A18 | A19 | A20 | A21 | A22 | A23 | A24 | |
| A25 | A26 | A27 | A28 | A29 | A30 | A31 | A32 | A33 | A34 | A35 | A36 | |
| A37 | A38 | A39 | A40 | A41 | A42 | A43 | A44 | A45 | A46 | A47 | A48 | |
| A49 | A50 | A51 | A52 | A53 | A54 | A55 | A56 | A57 | A58 | A59 | A60 | |
| A61 | A62 | A63 | A64 | A65 | A66 | A67 | A68 | A69 | A70 | A71 | A72 | |
| A73 | A74 | A75 | A76 | A77 | A78 | A79 | A80 | A81 | A82 | A83 | A84 | |
| A85 | A86 | A87 | A88 | A89 | A90 | - | - | - | - | - | - | |
| - | - | A99 | A100 | A101 | A102 | A103 | A104 | A105 | A106 | A107 | A108 | |
| A109 | A110 | A111 | A112 | A113 | A114 | A115 | A116 | A117 | A118 | A119 | A120 | |
| A121 | A122 | A123 | A124 | A125 | A126 | A127 | A128 | A129 | A130 | A131 | A132 | |
| A133 | A134 | A135 | A136 | A137 | A138 | A139 | A140 | A141 | A142 | A143 | A144 | |
| A145 | A146 | A147 | A148 | A149 | A150 | A151 | A152 | A153 | A154 | A155 | A156 | |
| A157 | A158 | A159 | A160 | A161 | A162 | A163 | A164 | A165 | A166 | A167 | A168 | |
| A169 | A170 | A171 | A172 | A173 | A174 | A175 | A176 | A177 | A178 | A179 | A180 | |
| A181 | A182 | A183 | A184 | A185 | A186 | A187 | A188 | A189 | A190 | A191 | A192 | |
| A193 | A194 | A195 | A196 | A197 | A198 | A199 | A200 | A201 | A202 | A203 | A204 | |
| A205 | A206 | A207 | A208 | A209 | A210 | A211 | A212 | A213 | A214 | A215 | A216 | |
| A217 | A218 | A219 | A220 | A221 | A222 | A223 | A224 | A225 | A226 | A227 | A228 | |
| A229 | A230 | A231 | A232 | A233 | A234 | A235 | A236 | A237 | A238 | A239 | A240 | |
| A241 | A242 | A243 | A244 | A245 | A246 | A247 | A248 | A249 | A250 | A251 | A252 | |
| A253 | A254 | A255 | A256 | A257 | A258 | A259 | A260 | A261 | A262 | A263 | A264 | |
| A265 | A266 | A267 | A268 | A269 | A270 | A271 | A272 | A273 | A274 | A275 | A276 | |
| A277 | A278 | A279 | A280 | A281 | A282 | A283 | A284 | A285 | A286 | A287 | A288 | |

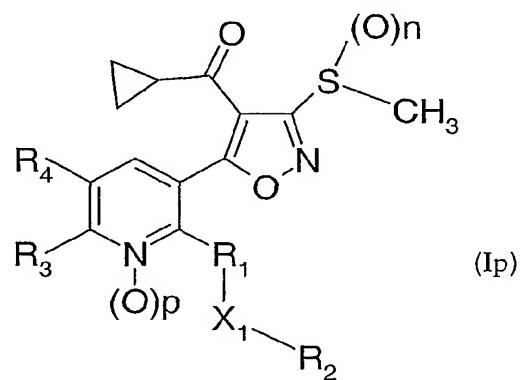
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| <u>D1/D2/</u> |
|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| <u>D3</u> |
| A289 | A290 | A291 | A292 | A293 | A294 | A295 | A296 | A297 | A298 | A299 | A300 | | |
| A301 | A302 | A303 | A304 | A305 | A306 | A307 | A308 | A309 | A310 | A311 | A312 | | |
| A313 | A314 | A315 | A316 | A317 | A318 | A319 | A320 | A321 | A322 | A323 | A324 | | |
| A325 | A326 | A327 | A328 | A329 | A330 | A331 | A332 | A333 | A334 | A335 | A336 | | |
| A337 | A338 | A339 | A340 | A341 | A342 | A343 | A344 | A345 | A346 | A347 | A348 | | |
| A349 | A350 | A351 | A352 | A353 | A354 | A355 | A356 | A357 | A358 | A359 | A360 | | |
| A361 | A362 | A363 | A364 | A365 | A366 | A367 | A368 | A369 | A370 | A371 | A372 | | |
| A373 | A374 | A375 | A376 | A377 | A378 | A379 | A380 | A381 | A382 | A383 | A384 | | |
| A385 | A386 | A387 | A388 | A389 | A390 | A391 | A392 | A393 | A394 | A395 | A396 | | |
| A397 | A398 | A399 | A400 | A401 | A402 | A403 | A404 | A405 | A406 | A407 | A408 | | |
| A409 | A410 | A411 | A412 | A413 | A414 | A415 | A416 | A417 | A418 | A419 | A420 | | |
| A421 | A422 | A423 | A424 | A425 | A426 | A427 | A428 | A429 | A430 | A431 | A432 | | |
| A433 | A434 | A435 | A436 | A437 | A438 | A439 | A440 | A441 | A442 | A443 | A444 | | |
| A445 | A446 | A447 | A448 | A449 | A450 | A451 | A452 | A453 | A454 | A455 | A456 | | |
| A457 | A458 | A459 | A460 | A461 | A462 | A463 | A464 | A465 | A466 | A467 | A468 | | |
| A469 | A470 | A471 | A472 | A473 | A474 | A475 | A476 | A477 | A478 | A479 | A480 | | |
| A481 | A482 | A483 | A484 | A485 | A486 | A487 | A488 | A489 | A490 | A491 | A492 | | |
| A493 | A494 | A495 | A496 | A497 | A498 | A499 | A500 | A501 | A502 | A503 | A504 | | |
| A505 | A506 | A507 | A508 | A509 | A510 | A511 | A512 | A513 | A514 | A515 | A516 | | |
| A517 | A518 | A519 | A520 | A521 | A522 | A523 | A524 | A525 | A526 | A527 | A528 | | |
| A529 | A530 | A531 | A532 | A533 | A534 | A535 | A536 | A537 | A538 | A539 | A540 | | |
| A541 | A542 | A543 | A544 | A545 | - | - | - | - | - | - | - | | |
| - | A554 | A555 | A556 | A557 | A558 | A559 | A560 | A561 | A562 | A563 | A564 | | |
| A565 | A566 | A567 | A568 | A569 | A570 | A571 | A572 | A573 | A574 | A575 | A576 | | |
| A577 | A578 | A579 | A580 | A581 | A582 | A583 | A584 | A585 | A586 | A587 | A588 | | |
| A589 | A590 | A591 | A592 | A593 | A594 | A595 | A596 | A597 | A598 | A599 | A600 | | |
| A601 | A602 | A603 | A604 | A605 | A606 | A607 | A608 | A609 | A610 | A611 | A612 | | |
| A613 | A614 | A615 | A616 | A617 | A618 | A619 | A620 | A621 | A622 | A623 | A624 | | |
| A625 | A626 | A627 | A628 | A629 | A630 | A631 | A632 | A633 | A634 | A635 | A636 | | |
| - | - | - | - | - | - | - | - | A644 | A645 | A646 | A647 | A648 | |
| A649 | A650 | A651 | A652 | A653 | A654 | A655 | A656 | A657 | A658 | A659 | A660 | | |

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| <u>D1/D2/</u> |
|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| <u>D3</u> |
| A661 | A662 | A663 | A664 | A665 | A666 | A667 | A668 | A669 | A670 | A671 | A672 | |
| A685 | A686 | A687 | A688 | A689 | A690 | A691 | A692 | A693 | A694 | A695 | A696 | |
| A697 | A698 | A699 | A700 | A701 | A702 | A703 | A704 | A705 | A706 | A707 | A708 | |
| A709 | A710 | A711 | A712 | A713 | A714 | A715 | A716 | A717 | A718 | A719 | A720 | |
| A721 | A722 | A723 | A724 | A725 | A726 | - | - | - | - | - | - | |
| A733 | A734 | A735 | A736 | A737 | A738 | A739 | A740 | A741 | A742 | A743 | A744 | |
| A745 | A746 | A747 | A748 | A749 | A750 | A751 | A752 | A753 | A754 | A755 | A756 | |
| A757 | A758 | A759 | A760 | A761 | A762 | A763 | A764 | A765 | A766 | A767 | A768 | |
| A769 | A770 | A771 | A772 | A773 | A774 | A775 | A776 | A777 | A778 | A779 | A780 | |
| A781 | A782 | A783 | A784 | A785 | A786 | A787 | A788 | A789 | A790 | A791 | A792 | |
| A793 | A794 | A795 | A796 | A797 | A798 | A799 | A800 | A801 | A802 | A803 | A804 | |
| A805 | A806 | A807 | A808 | A809 | A810 | A811 | A812 | A813 | A814 | A815 | A816 | |
| A817 | A818 | A819 | A820 | A821 | A822 | A823 | A824 | A825 | A826 | A827 | A828 | |
| A829 | A830 | A831 | A832 | - | - | - | - | - | - | - | - | |

Table 8: Compounds of the formula I_p:



in which R₁, R₂, R₃, R₄, X₁ and p have the same meaning as given for the radical A, and n is 0, 1 or 2:

| A | A | A | A | A | A | A | A | A | A | A | A | A | A | A |
|------|------|------|------|------|------|------|------|------|------|------|------|-----|---|---|
| - | - | - | - | - | - | - | - | A8 | A9 | A10 | A11 | A12 | | |
| A13 | A14 | A15 | A16 | A17 | A18 | A19 | A20 | A21 | A22 | A23 | A24 | | | |
| A25 | A26 | A27 | A28 | A29 | A30 | A31 | A32 | A33 | A34 | A35 | A36 | | | |
| A37 | A38 | A39 | A40 | A41 | A42 | A43 | A44 | A45 | A46 | A47 | A48 | | | |
| A49 | A50 | A51 | A52 | A53 | A54 | A55 | A56 | A57 | A58 | A59 | A60 | | | |
| A61 | A62 | A63 | A64 | A65 | A66 | A67 | A68 | A69 | A70 | A71 | A72 | | | |
| A73 | A74 | A75 | A76 | A77 | A78 | A79 | A80 | A81 | A82 | A83 | A84 | | | |
| A85 | A86 | A87 | A88 | A89 | A90 | - | - | - | - | - | - | | | |
| - | - | A99 | A100 | A101 | A102 | A103 | A104 | A105 | A106 | A107 | A108 | | | |
| A109 | A110 | A111 | A112 | A113 | A114 | A115 | A116 | A117 | A118 | A119 | A120 | | | |
| A121 | A122 | A123 | A124 | A125 | A126 | A127 | A128 | A129 | A130 | A131 | A132 | | | |
| A133 | A134 | A135 | A136 | A137 | A138 | A139 | A140 | A141 | A142 | A143 | A144 | | | |
| A145 | A146 | A147 | A148 | A149 | A150 | A151 | A152 | A153 | A154 | A155 | A156 | | | |
| A157 | A158 | A159 | A160 | A161 | A162 | A163 | A164 | A165 | A166 | A167 | A168 | | | |
| A169 | A170 | A171 | A172 | A173 | A174 | A175 | A176 | A177 | A178 | A179 | A180 | | | |
| A181 | A182 | A183 | A184 | A185 | A186 | A187 | A188 | A189 | A190 | A191 | A192 | | | |
| A193 | A194 | A195 | A196 | A197 | A198 | A199 | A200 | A201 | A202 | A203 | A204 | | | |
| A205 | A206 | A207 | A208 | A209 | A210 | A211 | A212 | A213 | A214 | A215 | A216 | | | |
| A217 | A218 | A219 | A220 | A221 | A222 | A223 | A224 | A225 | A226 | A227 | A228 | | | |
| A229 | A230 | A231 | A232 | A233 | A234 | A235 | A236 | A237 | A238 | A239 | A240 | | | |
| A241 | A242 | A243 | A244 | A245 | A246 | A247 | A248 | A249 | A250 | A251 | A252 | | | |
| A253 | A254 | A255 | A256 | A257 | A258 | A259 | A260 | A261 | A262 | A263 | A264 | | | |
| A265 | A266 | A267 | A268 | A269 | A270 | A271 | A272 | A273 | A274 | A275 | A276 | | | |
| A277 | A278 | A279 | A280 | A281 | A282 | A283 | A284 | A285 | A286 | A287 | A288 | | | |
| A289 | A290 | A291 | A292 | A293 | A294 | A295 | A296 | A297 | A298 | A299 | A300 | | | |
| A301 | A302 | A303 | A304 | A305 | A306 | A307 | A308 | A309 | A310 | A311 | A312 | | | |
| A313 | A314 | A315 | A316 | A317 | A318 | A319 | A320 | A321 | A322 | A323 | A324 | | | |
| A325 | A326 | A327 | A328 | A329 | A330 | A331 | A332 | A333 | A334 | A335 | A336 | | | |
| A337 | A338 | A339 | A340 | A341 | A342 | A343 | A344 | A345 | A346 | A347 | A348 | | | |
| A349 | A350 | A351 | A352 | A353 | A354 | A355 | A356 | A357 | A358 | A359 | A360 | | | |
| A361 | A362 | A363 | A364 | A365 | A366 | A367 | A368 | A369 | A370 | A371 | A372 | | | |
| A373 | A374 | A375 | A376 | A377 | A378 | A379 | A380 | A381 | A382 | A383 | A384 | | | |

| A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A |
|------|------|------|------|------|------|------|------|------|------|------|------|---|---|---|---|
| A385 | A386 | A387 | A388 | A389 | A390 | A391 | A392 | A393 | A394 | A395 | A396 | | | | |
| A397 | A398 | A399 | A400 | A401 | A402 | A403 | A404 | A405 | A406 | A407 | A408 | | | | |
| A409 | A410 | A411 | A412 | A413 | A414 | A415 | A416 | A417 | A418 | A419 | A420 | | | | |
| A421 | A422 | A423 | A424 | A425 | A426 | A427 | A428 | A429 | A430 | A431 | A432 | | | | |
| A433 | A434 | A435 | A436 | A437 | A438 | A439 | A440 | A441 | A442 | A443 | A444 | | | | |
| A445 | A446 | A447 | A448 | A449 | A450 | A451 | A452 | A453 | A454 | A455 | A456 | | | | |
| A457 | A458 | A459 | A460 | A461 | A462 | A463 | A464 | A465 | A466 | A467 | A468 | | | | |
| A469 | A470 | A471 | A472 | A473 | A474 | A475 | A476 | A477 | A478 | A479 | A480 | | | | |
| A481 | A482 | A483 | A484 | A485 | A486 | A487 | A488 | A489 | A490 | A491 | A492 | | | | |
| A493 | A494 | A495 | A496 | A497 | A498 | A499 | A500 | A501 | A502 | A503 | A504 | | | | |
| A505 | A506 | A507 | A508 | A509 | A510 | A511 | A512 | A513 | A514 | A515 | A516 | | | | |
| A517 | A518 | A519 | A520 | A521 | A522 | A523 | A524 | A525 | A526 | A527 | A528 | | | | |
| A529 | A530 | A531 | A532 | A533 | A534 | A535 | A536 | A537 | A538 | A539 | A540 | | | | |
| A541 | A542 | A543 | A544 | A545 | - | - | - | - | - | - | - | | | | |
| - | A554 | A555 | A556 | A557 | A558 | A559 | A560 | A561 | A562 | A563 | A564 | | | | |
| A565 | A566 | A567 | A568 | A569 | A570 | A571 | A572 | A573 | A574 | A575 | A576 | | | | |
| A577 | A578 | A579 | A580 | A581 | A582 | A583 | A584 | A585 | A586 | A587 | A588 | | | | |
| A589 | A590 | A591 | A592 | A593 | A594 | A595 | A596 | A597 | A598 | A599 | A600 | | | | |
| A601 | A602 | A603 | A604 | A605 | A606 | A607 | A608 | A609 | A610 | A611 | A612 | | | | |
| A613 | A614 | A615 | A616 | A617 | A618 | A619 | A620 | A621 | A622 | A623 | A624 | | | | |
| A625 | A626 | A627 | A628 | A629 | A630 | A631 | A632 | A633 | A634 | A635 | A636 | | | | |
| - | - | - | - | - | - | - | A644 | A645 | A646 | A647 | A648 | | | | |
| A649 | A650 | A651 | A652 | A653 | A654 | A655 | A656 | A657 | A658 | A659 | A660 | | | | |
| A661 | A662 | A663 | A664 | A665 | A666 | A667 | A668 | A669 | A670 | A671 | A672 | | | | |
| A685 | A686 | A687 | A688 | A689 | A690 | A691 | A692 | A693 | A694 | A695 | A696 | | | | |
| A697 | A698 | A699 | A700 | A701 | A702 | A703 | A704 | A705 | A706 | A707 | A708 | | | | |
| A709 | A710 | A711 | A712 | A713 | A714 | A715 | A716 | A717 | A718 | A719 | A720 | | | | |
| A721 | A722 | A723 | A724 | A725 | A726 | - | - | - | - | - | - | | | | |
| A733 | A734 | A735 | A736 | A737 | A738 | A739 | A740 | A741 | A742 | A743 | A744 | | | | |
| A745 | A746 | A747 | A748 | A749 | A750 | A751 | A752 | A753 | A754 | A755 | A756 | | | | |
| A757 | A758 | A759 | A760 | A761 | A762 | A763 | A764 | A765 | A766 | A767 | A768 | | | | |
| A769 | A770 | A771 | A772 | A773 | A774 | A775 | A776 | A777 | A778 | A779 | A780 | | | | |
| A781 | A782 | A783 | A784 | A785 | A786 | A787 | A788 | A789 | A790 | A791 | A792 | | | | |

| A | A | A | A | A | A | A | A | A | A | A | A | A | A | A |
|------|------|------|------|------|------|------|------|------|------|------|------|---|---|---|
| A793 | A794 | A795 | A796 | A797 | A798 | A799 | A800 | A801 | A802 | A803 | A804 | | | |
| A805 | A806 | A807 | A808 | A809 | A810 | A811 | A812 | A813 | A814 | A815 | A816 | | | |
| A817 | A818 | A819 | A820 | A821 | A822 | A823 | A824 | A825 | A826 | A827 | A828 | | | |
| A829 | A830 | A831 | A832 | - | - | - | - | - | - | - | - | | | |

Table 9: Compounds of the formula I, represented as compounds of the formula**A-Q**

in which A denotes A10:

| <u>A10</u> | |
|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|--|
| B1 | B2 | - | B4 | B5 | B6 | B7 | B8 | B9 | B10 | B11 | B12 | | | |
| B13 | B14 | B15 | B16 | B17 | B18 | B19 | B20 | B21 | B22 | B23 | B24 | | | |
| B25 | B26 | B27 | B28 | B29 | B30 | B31 | B32 | B33 | B34 | B35 | B36 | | | |
| B37 | B38 | - | B40 | B41 | B42 | B43 | B44 | B45 | B46 | B47 | B48 | | | |
| B49 | B50 | B51 | - | B53 | B54 | B55 | B56 | B57 | B58 | B59 | B60 | | | |
| B61 | B62 | B63 | B64 | B65 | B66 | B67 | B68 | B69 | B70 | B71 | B72 | | | |
| B73 | B74 | B75 | B76 | B77 | B78 | B79 | B80 | B81 | B82 | B83 | B84 | | | |
| B85 | B86 | B87 | B88 | B89 | B90 | B91 | B92 | B93 | B94 | | B96 | | | |
| B97 | B98 | B99 | B100 | B101 | B102 | B103 | B104 | B105 | B106 | B107 | B108 | | | |
| B109 | B110 | - | - | - | - | - | - | - | - | - | - | | | |

Table 10: Compounds of the formula I, represented as compounds of the formula**A-Q**

in which A denotes A10:

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| <u>A10</u> |
|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| C1 | - | C3 | C4 | - | C6 | C7 | C8 | C9 | C10 | C11 | C12 | |
| C13 | C14 | C15 | C16 | C17 | C18 | C19 | C20 | C21 | C22 | C23 | C24 | |
| C25 | C26 | C27 | - | - | - | - | - | - | - | - | - | |

Table 11: Compounds of the formula I, represented as compounds of the formula

A-Q

in which A denotes A10:

| <u>A10</u> |
|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| - | - | - | D4 | D5 | D6 | D7 | D8 | D9 | D10 | D11 | D12 |

Table 12: Compounds of the formula I, represented as compounds of the formula

A-Q

in which A denotes A556:

| <u>A556</u> |
|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| B1 | B2 | - | B4 | B5 | B6 | B7 | B8 | B9 | B10 | B11 | B12 | |
| B13 | B14 | B15 | B16 | B17 | B18 | B19 | B20 | B21 | B22 | B23 | B24 | |
| B25 | B26 | B27 | B28 | B29 | B30 | B31 | B32 | B33 | B34 | B35 | B36 | |
| B37 | B38 | - | B40 | B41 | B42 | B43 | B44 | B45 | B46 | B47 | B48 | |
| B49 | B50 | B51 | - | B53 | B54 | B55 | B56 | B57 | B58 | B59 | B60 | |
| B61 | B62 | B63 | B64 | B65 | B66 | B67 | B68 | B69 | B70 | B71 | B72 | |
| B73 | B74 | B75 | B76 | B77 | B78 | B79 | B80 | B81 | B82 | B83 | B84 | |
| B85 | B86 | B87 | B88 | B89 | B90 | B91 | B92 | B93 | B94 | | B96 | |
| B97 | B98 | B99 | B100 | B101 | B102 | B103 | B104 | B105 | B106 | B107 | B108 | |

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| | | | | | | | | | | | | |
|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <u>A556</u> |
| B109 | B110 | - | - | - | - | - | - | - | - | - | - | - |

Table 13: Compounds of the formula I, represented as compounds of the formula

A-Q

in which A denotes A556:

| | | | | | | | | | | | | |
|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <u>A556</u> |
| C1 | - | C3 | C4 | - | C6 | C7 | C8 | C9 | C10 | C11 | C12 | |
| C13 | C14 | C15 | C16 | C17 | C18 | C19 | C20 | C21 | C22 | C23 | C24 | |
| C25 | C26 | C27 | - | - | - | - | - | - | - | - | - | |

Table 14: Compounds of the formula I, represented as compounds of the formula

A-Q

in which A denotes A556:

| | | | | | | | | | | | | |
|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <u>A556</u> |
| - | - | - | - | D4 | D5 | D6 | D7 | D8 | D9 | D10 | D11 | D12 |

Table 15: Compounds of the formula I, represented as compounds of the formula

A-Q

in which A denotes A646:

| <u>A646</u> |
|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| B1 | B2 | - | B4 | B5 | B6 | B7 | B8 | B9 | B10 | B11 | B12 | | |
| B13 | B14 | B15 | B16 | B17 | B18 | B19 | B20 | B21 | B22 | B23 | B24 | | |
| B25 | B26 | B27 | B28 | B29 | B30 | B31 | B32 | B33 | B34 | B35 | B36 | | |
| B37 | B38 | - | B40 | B41 | B42 | B43 | B44 | B45 | B46 | B47 | B48 | | |
| B49 | B50 | B51 | - | B53 | B54 | B55 | B56 | B57 | B58 | B59 | B60 | | |
| B61 | B62 | B63 | B64 | B65 | B66 | B67 | B68 | B69 | B70 | B71 | B72 | | |
| B73 | B74 | B75 | B76 | B77 | B78 | B79 | B80 | B81 | B82 | B83 | B84 | | |
| B85 | B86 | B87 | B88 | B89 | B90 | B91 | B92 | B93 | B94 | | | B96 | |
| B97 | B98 | B99 | B100 | B101 | B102 | B103 | B104 | B105 | B106 | B107 | B108 | | |
| B109 | B110 | - | - | - | - | - | - | - | - | - | - | - | |

Table 16: Compounds of the formula I, represented as compounds of the formula

A-Q

in which A denotes A646:

| <u>A646</u> |
|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| C1 | - | C3 | C4 | - | C6 | C7 | C8 | C9 | C10 | C11 | C12 | | |
| C13 | C14 | C15 | C16 | C17 | C18 | C19 | C20 | C21 | C22 | C23 | C24 | | |
| C25 | C26 | C27 | - | - | - | - | - | - | - | - | - | - | |

Table 17: Compounds of the formula I, represented as compounds of the formula

A-Q

in which A denotes A646:

| A646 |
|------|------|------|------|------|------|------|------|------|------|------|------|------|
| - | - | - | D4 | D5 | D6 | D7 | D8 | D9 | D10 | D11 | D12 | |

Table 18: Physical data for the compounds of the formula I given in the tables above: (the melting points are given in °C.)

| Compound | m.p. (range) | Phys. state |
|----------------------------|--------------|------------------|
| A1-C2 | 138-140 | crystalline |
| A2-C2 | 138-140 | crystalline |
| A833-B52 (K ⁺) | 145-150 | crystalline |
| A833-B52 (H ₄) | - | oil |
| A830-B52 | - | amorphous/liquid |
| A829-B52 | - | oil |
| A829-B1 | - | oil |
| A10-B52 (H ₃) | 54-56 | crystalline |
| A10-B1 | 71-73 | crystalline |
| A10-B3 | - | viscous |
| A10-B14 | - | viscous |
| A10-B39 | 99-100 | crystalline |
| A736-B52 | 100-102 | crystalline |
| A10-C2 (H ₆) | - | viscous |
| A57-B52 (H ₅) | 54-56 | crystalline |
| A18-B52 | 71-74 | crystalline |
| A8-B52 | 95-98 | crystalline |
| A19-B52 | 53-55 | crystalline |
| A1-C5 | 32-34 | crystalline |
| A2-C5 | 32-33 | crystalline |
| A10-C5 | - | resin |
| A11-C5 | 38-39 | crystalline |
| A11-B52 | - | resin |
| A834-B52 | - | crystalline |
| A835-B52 | - | viscous |
| A854-B52 | - | viscous |
| A90-B52 | - | viscous |

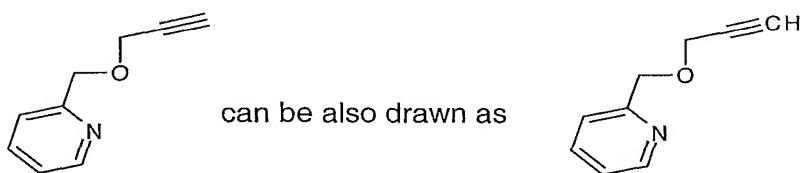
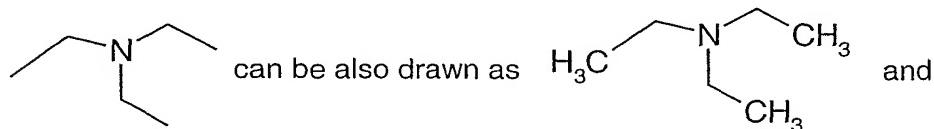
| Compound | m.p. (range) | Phys. state |
|--------------------------------------|--------------|-------------|
| A33-B52 | 113-115 | crystalline |
| A556-B52 | - | crystalline |
| A646-B52 | - | viscous |
| A868-B52 | 106-107 | crystalline |
| A855-B52 | - | viscous |
| A817-B52 | - | viscous |
| A819-B52 | - | crystalline |
| A856-B52 | - | solid |
| A857-B52 | - | viscous |
| A63-B52 | - | resin |
| A20-B52 | - | solid |
| A858-B52 | - | resin |
| A836-B52 | - | crystalline |
| A859-B52 | - | viscous |
| A818-B52 | - | viscous |
| A837-B52 | - | viscous |
| A28-B52 | - | viscous |
| A28-B52 (Et_3NH^+) | - | crystalline |
| A838-B52 | - | viscous |
| A839-B52 | - | viscous |
| A860-B52 | - | viscous |
| A860-B113 | - | viscous |
| A861-B52 | 90-93 | crystalline |
| A840-B52 | - | oil |
| A841-B52 | 41-43 | crystalline |
| A842-B52 | - | viscous |
| A843-B52 | - | viscous |
| A866-B100 | 96-98 | crystalline |
| A844-B52 | - | viscous |
| A866-B112 | - | viscous |
| A867-B112 | - | viscous |
| A856-B112 | 79-81 | crystalline |
| A20-C5 | - | viscous |
| A10-C28 | - | resin |
| <u>A11-C28</u> | - | resin |

| Compound | m.p. (range) | Phys. state |
|--|--------------|------------------|
| A10-B52 (Et_3NH^+) | - | viscous |
| A862-B52 | - | viscous |
| A24-B52 | 102-105 | crystalline |
| A845-B52 | 40-44 | crystalline |
| A837-B52 (Et_3NH^+) | - | viscous |
| A67-B52 | 68-69 | crystalline |
| A863-B52 | 80-80 | crystalline |
| A10-B17 | 40-42 | crystalline |
| A846-B52 | - | crystalline |
| A847-B52 | - | viscous |
| A848-B52 | - | crystalline |
| A56-B52 | - | vitreous |
| A26-B52 | - | vitreous |
| A849-B52 | - | viscous |
| A10-B4 | - | viscous |
| A865-B52 | - | viscous |
| A850-B52 | 63-64 | crystalline |
| A10-C29 | - | resin |
| A10-B111 | 76-78 | crystalline |
| A3-C5 | - | resin |
| A834-C5 | - | resin |
| A851-B52 | - | vitreous |
| A852-B52 | - | viscous |
| A10-B25 | - | amorphous/liquid |
| A853-B52 | - | viscous |
| A27-B52 | - | oil |
| A864-C5 | 149-150 | crystalline |
| A864-B52 | 110-112 | crystalline |
| A834-B39 | - | oil |
| A-852-OH | - | oil |
| A-851-OH | 102-103 | crystalline |
| A-835-OH | - | oil |
| A-24-OH | - | solid |
| A-858-OH | - | oil |

| Compound | m.p. (range) | Phys. state |
|----------|--------------|-------------|
| A-859-OH | - | oil |
| A-864-OH | - | solid |
| A-851-OH | 73-74 | crystalline |
| A-848-OH | 81-82 | crystalline |
| A-27-OH | - | oil |
| A-855-OH | 102-104 | crystalline |
| A-90-OH | 111-114 | crystalline |
| A-124-OH | 117-119 | crystalline |
| A-834-OH | - | crystalline |
| A-852-OH | - | oil |
| A-851-OH | 102-103 | crystalline |
| A-835-OH | - | oil |
| A10-OH | 62-63 | crystalline |
| A830-OH | 157-158 | crystalline |
| A831-OH | 188-189 | crystalline |
| A829-OH | 131-134 | crystalline |
| A832-OH | 110-112 | crystalline |

Table 19: Physical data for the compounds of the formula I given in the tables above: (the melting points given in °C.):

In the following formulas, end-standing valences denote methyl groups (in all cases except alkyne or alkene groups) or hydrogen (in the case of alkyne or alkene groups), for example



| Comp. No. | Corresponding Formula | m.p. (range) |
|--------------|-----------------------|------------------------|
| | | Phys. state |
| 1.001 | | 138-140 crystalline |
| 1.002 | | 145-150 crystalline |
| 1.003 | | oil |

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| Comp. No. | Corresponding Formula | m.p. (range) Phys. state |
|--------------|-----------------------|--|
| 1.004 | | oil |
| 1.005 | | oil |
| 1.006 | | oil |
| 1.007 | | 54-56 crystalline |
| 1.008 | | crystalline |
| 1.009 | | viscous, 1H NMR; 1.82 (s); 3.26 (s); 3.37-3.39 (m); 3.57- 3.60(m); 3.71(s); 4.84 (s); 7.74 (d); 7.82 (d) |

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| Comp. No. | Corresponding Formula | m.p. (range) |
|--------------|-----------------------|------------------------|
| | | Phys. state |
| 1.010 | | viscous |
| 1.011 | | viscous |
| 1.012 | | 99-100 crystalline |
| 1.013 | | 100-102 crystalline |
| 1.014 | | viscous |
| 1.015 | | 54-56 crystalline |
| 1.016 | | 71-74 crystalline |
| 1.017 | | 95-98 crystalline |

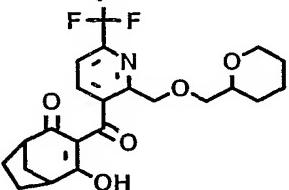
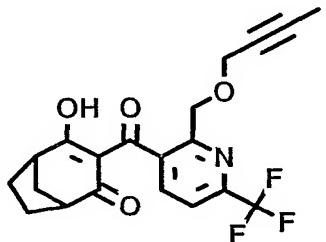
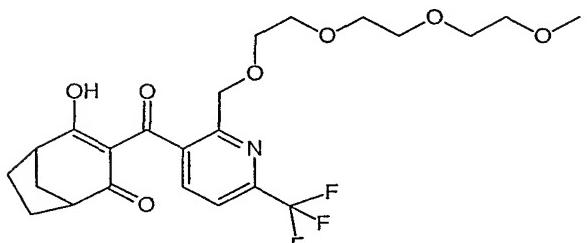
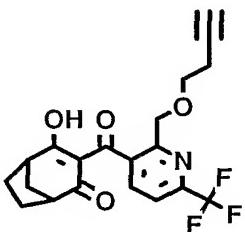
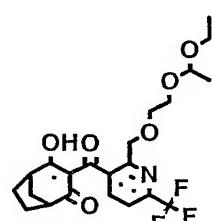
- 135 -

| Comp. No. | Corresponding Formula | m.p. (range) Phys. state |
|--------------|-----------------------|-----------------------------|
| 1.018 | | 53-55 crystalline |
| 1.019 | | 32-34 crystalline |
| 1.020 | | 32-33 crystalline |
| 1.021 | | resin |
| 1.022 | | 38-39 crystalline |
| 1.023 | | resin |
| 1.024 | | crystalline |

| Comp. No. | Corresponding Formula | m.p. (range) Phys. state |
|--------------|-----------------------|-----------------------------|
| 1.025 | | viscous |
| 1.026 | | viscous |
| 1.027 | | viscous |
| 1.028 | | 113-115 crystalline |
| 1.029 | | crystalline |
| 1.030 | | viscous |

| Comp. No. | Corresponding Formula | m.p. (range) Phys. state |
|--------------|-----------------------|-----------------------------|
| 1.031 | | 106-107 crystalline |
| 1.032 | | viscous |
| 1.033 | | viscous |
| 1.034 | | crystalline |
| 1.035 | | crystalline |
| 1.036 | | viscous |

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| Comp. No. | Corresponding Formula | m.p. (range) Phys. state |
|--------------|---|-----------------------------|
| 1.037 |  | resin |
| 1.038 |  | solid |
| 1.039 |  | resin |
| 1.040 |  | crystalline |
| 1.041 |  | viscous |

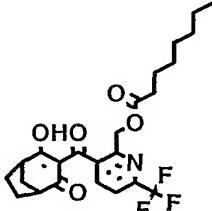
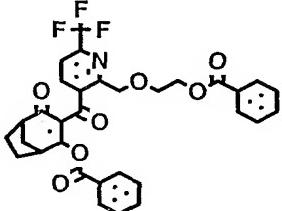
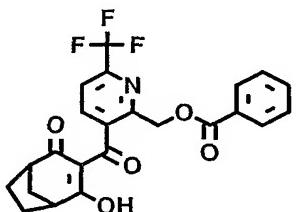
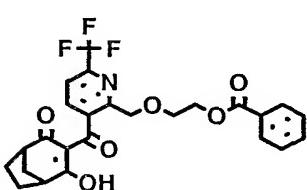
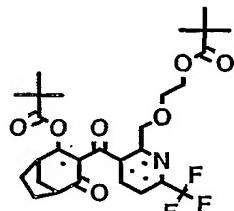
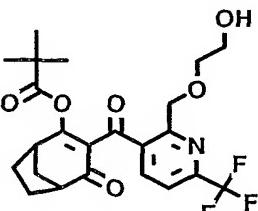
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| Comp. No. | Corresponding Formula | m.p. (range) Phys. state |
|--------------|-----------------------|-----------------------------|
| 1.042 | | viscous |
| 1.043 | | viscous |
| 1.044 | | viscous |
| 1.045 | | crystalline |
| 1.046 | | viscous |
| 1.047 | | viscous |

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| Comp. No. | Corresponding Formula | m.p. (range) Phys. state |
|--------------|-----------------------|-----------------------------|
| 1.048 | | viscous |
| 1.049 | | viscous |
| 1.050 | | 90-93 |
| 1.051 | | oil |
| 1.052 | | 41-43 |
| 1.053 | | viscous |

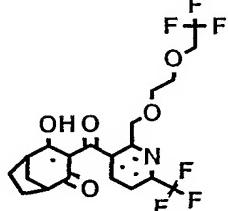
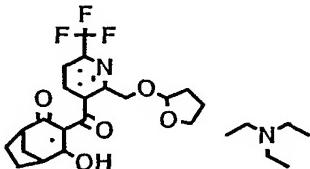
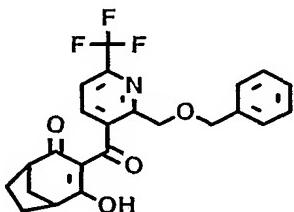
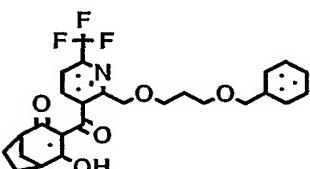
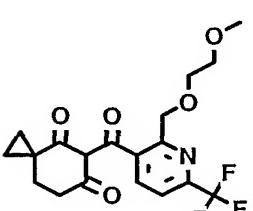
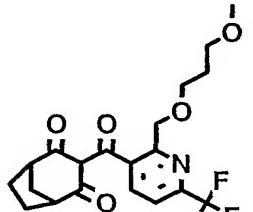
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| Comp. No. | Corresponding Formula | m.p. (range) Phys. state |
|--------------|---|-----------------------------|
| 1.054 |  | viscous |
| 1.055 |  | 96-98 |
| 1.056 |  | viscous |
| 1.057 |  | viscous |
| 1.058 |  | viscous |
| 1.059 |  | 79-81 |

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| Comp. No. | Corresponding Formula | m.p. (range) Phys. state |
|--------------|-----------------------|-----------------------------|
| 1.060 | | viscous |
| 1.061 | | viscous |
| 1.062 | | resin |
| 1.063 | | crystalline |
| 1.064 | | viscous |
| 1.065 | | 102-105 crystalline |

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| Comp. No. | Corresponding Formula | m.p. (range) Phys. state |
|--------------|---|-----------------------------|
| 1.066 |  | 40-44 crystalline |
| 1.067 |  | viscous |
| 1.068 |  | 68-69 crystalline |
| 1.069 |  | 78-80 crystalline |
| 1.070 |  | 40-42 |
| 1.071 |  | crystalline |

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| Comp. No. | Corresponding Formula | m.p. (range) Phys. state |
|--------------|-----------------------|-----------------------------|
| 1.072 | | viscous |
| 1.073 | | 46-47 crystalline |
| 1.074 | | vitreous |
| 1.075 | | vitreous |
| 1.076 | | 75-76 |
| 1.077 | | viscous |

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| Comp. No. | Corresponding Formula | m.p. (range) Phys. state |
|--------------|-----------------------|-----------------------------|
| 1.078 | | viscous |
| 1.079 | | viscous |
| 1.080 | | 63-64 crystalline |
| 1.081 | | resin |
| 1.082 | | 76-78 crystalline |
| 1.083 | | resin |

| Comp. No. | Corresponding Formula | m.p. (range) Phys. state |
|--------------|-----------------------|-----------------------------|
| 1.084 | | resin |
| 1.085 | | vitreous |
| 1.086 | | viscous |
| 1.087 | | oil |
| 1.088 | | viscous |
| 1.089 | | oil |

| Comp. No. | Corresponding Formula | m.p. (range) Phys. state |
|--------------|-----------------------|-----------------------------|
| 1.090 | | 149-150 crystalline |
| 1.091 | | 110-112 crystalline |
| 1.092 | | crystalline |

Biological examples

Example B1: Herbicidal action before emergence of the plants (pre-emergence action)

Monocotyledonous and dicotyledonous test plants are sown in standard soil in pots.

Immediately after sowing, the test substances are sprayed on at an optimum dosage (500 l of water/ha) as an aqueous suspension (prepared from a wettable powder (example F3, b) according to WO 97/34485) or emulsion (prepared from an emulsion concentrate (example F1, c) according to WO 97/34485). The test plants are then grown under optimum conditions in a greenhouse.

After a test period of 4 weeks, the test is evaluated using a 9-level scale of ratings (1 = complete damage, 9 = no effect). Ratings of 1 to 4 (in particular 1 to 3) mean good to very good herbicidal action.

Table B1: Pre-emergence action: ("NT" means "not tested");

| Compound | g/ha | Panicum | Digitaria | Echino. | Abutilon | Amaranthus | Chenop. |
|--|------|---------|-----------|---------|----------|------------|---------|
| A10-B1 | 250 | 2 | 2 | 2 | 1 | 1 | 1 |
| A10-B52, (H3) | 250 | 1 | 1 | 1 | 1 | 1 | 1 |
| A830-B52 | 250 | 4 | 9 | 3 | 5 | 4 | 4 |
| A1-C2 | 250 | 6 | 3 | 3 | 4 | 3 | 1 |
| A833-B52 (K+) | 250 | 1 | 2 | 2 | 1 | 2 | 1 |
| A833-B52, (H4) | 250 | 1 | 1 | 1 | 1 | 1 | 1 |
| A10-B1 | 250 | 2 | 2 | 2 | 1 | 1 | 1 |
| A10-B3 | 250 | 1 | 1 | 1 | 1 | 1 | 1 |
| A10-B14 | 250 | 3 | 6 | 3 | 1 | 1 | 1 |
| A10-B39 | 250 | 1 | 1 | 1 | 1 | 1 | 1 |
| A736-B52 | 250 | 1 | 4 | 2 | 1 | 1 | 1 |
| A10-C2 (H6) | 250 | 3 | 3 | 3 | 1 | 2 | 1 |
| A57-B52 (H5) | 250 | 1 | 1 | 1 | 1 | 1 | 1 |
| A18-B52 | 250 | 1 | 1 | 1 | 2 | 2 | NT |
| A8-B52 | 250 | 1 | 1 | 1 | 1 | 1 | NT |
| A19-B52 | 250 | 1 | 1 | 1 | 1 | 2 | NT |
| A1-C5 | 250 | 2 | 2 | 1 | 2 | 2 | 1 |
| A2-C5 | 250 | 1 | 2 | 2 | 1 | 1 | 1 |
| A10-C5 | 250 | 2 | 3 | 1 | 1 | 1 | 1 |
| A11-C5 | 250 | 1 | 2 | 1 | 1 | 1 | 1 |
| A11-B52 | 250 | 1 | 1 | 1 | 1 | 2 | 1 |
| A834-B52 | 250 | 1 | 1 | 1 | 1 | 2 | 1 |
| A835-B52 | 250 | 1 | 2 | 1 | 2 | 1 | 2 |
| A556-B52 | 250 | 1 | 1 | 1 | 1 | 2 | 1 |
| A646-B52 | 250 | 1 | 1 | 1 | 1 | 2 | 1 |
| A819-B52 | 250 | 7 | 9 | 7 | 1 | 2 | 1 |
| A63-B52 | 250 | 2 | 3 | 1 | 5 | 3 | NT |
| A20-B52 | 250 | 1 | 1 | 1 | 3 | 3 | NT |
| A836-B52 | 250 | 1 | 2 | 1 | 5 | 2 | 3 |
| A837-B52 | 250 | 1 | 2 | 2 | 1 | 2 | NT |
| A28-B52 | 250 | 1 | 2 | 2 | 2 | 3 | NT |
| A28-B52 (Et ₃ NH ⁺) | 250 | 1 | 2 | 2 | 3 | 1 | NT |

| Compound | g/ha | Panicum | Digitaria | Echino. | Abutilon | Amaranthus | Chenop. |
|---|------|---------|-----------|---------|----------|------------|---------|
| A838-B52 | 250 | 1 | 3 | 2 | 1 | 1 | 1 |
| A839-B52 | 250 | 1 | 3 | 2 | 1 | 1 | 1 |
| A840-B52 | 250 | 1 | 2 | 2 | 2 | 2 | 1 |
| A841-B52 | 250 | 1 | 2 | 1 | 1 | 1 | 1 |
| A842-B52 | 250 | 1 | 6 | 2 | 2 | 2 | 1 |
| A843-B52 | 250 | 1 | 2 | 2 | 1 | 1 | 1 |
| A844-B52 | 250 | 1 | 2 | 2 | 1 | 1 | 1 |
| A20-C5 | 250 | 1 | 2 | 2 | 1 | 1 | 1 |
| A10-C28 | 250 | 1 | 3 | 2 | 1 | 1 | 1 |
| A11-C28 | 250 | 2 | 2 | 1 | 2 | 1 | 1 |
| A10-B52 (Et ₃ NH ⁺) | 250 | 1 | 1 | 2 | 1 | 1 | 1 |
| A24-B52 | 250 | 1 | 1 | 1 | 1 | 1 | 1 |
| A845-B52 | 250 | 1 | 1 | 1 | 1 | 1 | 1 |
| A837-B52 (Et ₃ NH ⁺) | 250 | 1 | 1 | 2 | 1 | 1 | 1 |
| A67-B52 | 250 | 1 | 2 | 2 | 3 | 2 | 1 |
| A10-B17 | 250 | 1 | 1 | 1 | 4 | 2 | 1 |
| A846-B52 | 250 | 1 | 1 | 1 | 2 | 1 | 1 |
| A847-B52 | 250 | 1 | 3 | 2 | 4 | 1 | 4 |
| A848-B52 | 250 | 1 | 1 | 1 | 7 | 1 | 1 |
| A56-B52 | 250 | 1 | 2 | 1 | 3 | 1 | 1 |
| A26-B52 | 250 | 1 | 1 | 1 | 1 | 1 | 1 |
| A849-B52 | 250 | 1 | 2 | 2 | 2 | 1 | 1 |
| A10-B4 | 250 | 2 | 3 | 1 | 3 | 1 | 1 |
| A850-B52 | 250 | 1 | 2 | 1 | 1 | 2 | 1 |
| A10-C29 | 250 | 2 | 2 | 1 | 1 | 1 | NT |
| A10-B111 | 250 | 1 | 1 | 1 | 1 | 1 | NT |
| A3-C5 | 250 | 1 | 2 | 2 | 1 | 1 | NT |
| A834-C5 | 250 | 1 | 3 | 1 | 1 | 2 | NT |
| A851-B52 | 250 | 1 | 1 | 1 | 1 | 1 | 1 |
| A852-B52 | 250 | 1 | 1 | 1 | 4 | 1 | 2 |
| A10-B25 | 250 | 1 | 1 | 2 | 1 | 1 | 1 |
| A853-B52 | 250 | 1 | 1 | 2 | 1 | 1 | 2 |
| A27-B52 | 250 | 1 | 2 | 3 | 4 | 1 | 3 |

The same results are obtained when the compounds of the formula I are formulated according to the other examples of WO 97/34485.

Example B2: Post-emergence herbicidal action

Monocotyledonous and dicotyledonous test plants are grown in standard soil in pots. At the 2- to 3-leaf stage of the test plants, the test substances are sprayed at optimum dosage (500 l of water/ha) as an aqueous suspension (prepared from a wettable powder (example F3, b) according to WO 97/34485) or emulsion (prepared from an emulsion concentrate (example F1, c) according to WO 97/34485). The test plants are then grown further under optimum conditions in a greenhouse.

After a test period of 2 to 3 weeks, the test is evaluated using a 9-level scale of rating (1 = complete damage, 9 = no effect). Ratings of 1 to 4 (in particular 1 to 3) mean good to very good herbicidal action.

Table B2: Post-emergence action:

| Compound | g/ha | Panicum | Digitaria | Echino. | Abutilon | Xanth. | Ipopur. | Amaranth | Chenop. |
|----------------|------|---------|-----------|---------|----------|--------|---------|----------|---------|
| A10-B1 | 250 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 |
| A10-B52, (H3) | 250 | 1 | 1 | 2 | 1 | 2 | 2 | 2 | 1 |
| A830-B52 | 250 | 4 | 9 | 3 | 5 | 4 | 5 | 4 | 4 |
| A829-B52 | 250 | 2 | 6 | 4 | 3 | 6 | 4 | 2 | 2 |
| A829-B1 | 250 | 7 | 9 | 7 | 7 | 4 | 6 | 2 | 2 |
| A1-C2 | 250 | 7 | 8 | 4 | 3 | 4 | 3 | 2 | 4 |
| A833-B52 (K+) | 250 | 3 | 3 | 4 | 3 | 2 | 3 | 3 | 3 |
| A833-B52, (H4) | 250 | 3 | 3 | 4 | 3 | 1 | 2 | 2 | 3 |
| A10-B3 | 250 | 1 | 1 | 3 | 1 | 1 | 2 | 1 | 1 |
| A10-B14 | 250 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 1 |
| A10-B39 | 250 | 1 | 3 | 3 | 1 | 2 | 2 | 1 | 1 |
| A736-B52 | 250 | 1 | 1 | 2 | 1 | 2 | 2 | 1 | 1 |
| A10-C2 (H6) | 250 | 2 | 4 | 3 | 2 | 1 | 3 | 1 | 1 |
| A57-B52 (H5) | 250 | 1 | 1 | 2 | 1 | 2 | 2 | 1 | 1 |
| A18-B52 | 250 | 1 | 1 | 2 | 1 | 2 | 2 | 1 | 1 |
| A8-B52 | 250 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 |
| A19-B52 | 250 | 1 | 1 | 2 | 1 | 2 | 1 | 1 | 1 |

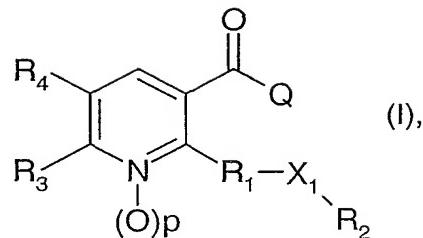
| Compound | | g/ha | Panicum | Digitaria | Echino. | Abutilon | Xanth. | Ipopur. | Amaranth | Chenop. |
|------------------------------------|-----|------|---------|-----------|---------|----------|--------|---------|----------|---------|
| A1-C5 | 250 | 4 | 2 | 2 | 2 | 4 | 2 | 2 | 1 | |
| A2-C5 | 250 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | |
| A10-C5 | 250 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | |
| A11-C5 | 250 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | |
| A11-B52 | 250 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | |
| A834-B52 | 250 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | |
| A835-B52 | 250 | 1 | 1 | 2 | 2 | 3 | 2 | 2 | 1 | |
| A854-B52 | 250 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | |
| A90-B52 | 250 | 2 | 2 | 3 | 2 | 3 | 4 | 3 | 1 | |
| A33-B52 | 250 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 1 | |
| A556-B52 | 250 | 1 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | |
| A646-B52 | 250 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | |
| A855-B52 | 250 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | |
| A817-B52 | 250 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | |
| A819-B52 | 250 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 1 | |
| A856-B52 | 250 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | |
| A857-B52 | 250 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | |
| A63-B52 | 250 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | |
| A20-B52 | 250 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | |
| A858-B52 | 250 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | |
| A836-B52 | 250 | 2 | 2 | 2 | 2 | 3 | 3 | 2 | 1 | |
| A859-B52 | 250 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | |
| A818-B52 | 250 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 1 | |
| A837-B52 | 250 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | |
| A28-B52 | 250 | 1 | 2 | 2 | 2 | 3 | 4 | 1 | 1 | |
| A28-B52 | | | | | | | | | | |
| (Et ₃ NH ⁺) | 250 | 1 | 2 | 2 | 2 | 3 | 2 | 2 | 1 | |
| A838-B52 | 250 | 2 | 2 | 3 | 1 | 2 | 2 | 2 | 1 | |
| A839-B52 | 250 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | |
| A860-B52 | 250 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | |
| A861-B52 | 250 | 2 | 3 | 5 | 3 | 2 | 2 | 2 | 1 | |
| A840-B52 | 250 | 2 | 3 | 4 | 3 | 3 | 3 | 2 | 1 | |
| A841-B52 | 250 | 2 | 4 | 4 | 3 | 3 | 3 | 1 | 1 | |
| A842-B52 | 250 | 3 | 3 | 5 | 3 | 3 | 3 | 2 | 1 | |
| A843-B52 | 250 | 2 | 3 | 3 | 3 | 3 | 6 | 3 | 1 | |

| Compound | g/ha | Panicum | Digitaria | Echino. | Abutilon | Xanth. | Ipopur. | Amaranth | Chenop. |
|------------------------------------|------|---------|-----------|---------|----------|--------|---------|----------|---------|
| A844-B52 | 250 | 2 | 3 | 4 | 3 | 3 | 3 | 3 | 1 |
| A856-B112 | 250 | 3 | 3 | 5 | 2 | 3 | 3 | 3 | 1 |
| A20-C5 | 250 | 2 | 3 | 4 | 3 | 3 | 3 | 2 | 1 |
| A10-C28 | 250 | 4 | 4 | 4 | 3 | 3 | 3 | 2 | 1 |
| A11-C28 | 250 | 3 | 4 | 4 | 3 | 3 | 3 | 2 | 1 |
| A10-B52 | | | | | | | | | |
| (Et ₃ NH ⁺) | 250 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 |
| A862-B52 | 250 | 2 | 2 | 3 | 3 | 2 | 5 | 2 | 1 |
| A24-B52 | 250 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 |
| A845-B52 | 250 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 |
| A837-B52 | | | | | | | | | |
| (Et ₃ NH ⁺) | 250 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 |
| A67-B52 | 250 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 1 |
| A863-B52 | 250 | 2 | 2 | 3 | 2 | 2 | 3 | 2 | 1 |
| A10-B17 | 250 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 1 |
| A846-B52 | 250 | 1 | 2 | 2 | 2 | 2 | 1 | 2 | 2 |
| A847-B52 | 250 | 1 | 2 | 1 | 2 | 2 | 4 | 3 | 1 |
| A848-B52 | 250 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 |
| A56-B52 | 250 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 1 |
| A26-B52 | 250 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 |
| A849-B52 | 250 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 2 |
| A10-B4 | 250 | 1 | 1 | 2 | 1 | 2 | 1 | 2 | 1 |
| A850-B52 | 250 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 |
| A10-C29 | 250 | 2 | 3 | 3 | 2 | 2 | 1 | 2 | 1 |
| A10-B111 | 250 | 2 | 2 | 3 | 3 | 3 | 3 | 2 | 1 |
| A3-C5 | 250 | 3 | 4 | 3 | 3 | 3 | 3 | 3 | 1 |
| A851-B52 | 250 | 3 | 3 | 4 | 3 | 3 | 3 | 2 | 1 |
| A852-B52 | 250 | 3 | 4 | 4 | 3 | 3 | 3 | 3 | 1 |
| A10-B25 | 250 | 3 | 4 | 4 | 3 | 3 | 3 | 2 | 1 |
| A27-B52 | 250 | 1 | 2 | 2 | 3 | 2 | 4 | 2 | 5 |
| A864-C5 | 250 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 1 |
| A864-B52 | 250 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 |

The same results are obtained when the compounds of the formula I are formulated according to the other examples of WO 97/34485.

WHAT IS CLAIMED IS:

1. A compound of the formula I



in which

p is 0 or 1;

R₁ is a C₁-C₆alkylene, C₃-C₆alkenylene or C₃-C₆alkynylene chain which may be mono- or polysubstituted by halogen or R₅, where the unsaturated bonds of the chain are not attached directly to the substituent X₁;

X₁ is oxygen, -O(CO)-, -(CO)O-, -O(CO)O-, -N(R₆)-O-, -O-NR₅₁⁻, thio, sulfinyl, sulfonyl, -SO₂NR₇⁻, -NR₅₂SO₂⁻ or -NR₈⁻;

R₂ is a C₁-C₈alkyl, C₃-C₆alkenyl or C₃-C₆alkynyl group which is mono- or polysubstituted by halogen, hydroxyl, amino, formyl, nitro, cyano, mercapto, carbamoyl, C₁-C₆alkoxy, C₁-C₆alkoxycarbonyl, C₂-C₆alkenyl, C₂-C₆haloalkenyl, C₂-C₆alkynyl, C₂-C₆haloalkynyl, C₃-C₆cycloalkyl, by halogen-substituted C₃-C₆cycloalkyl, or by C₃-C₆alkenyloxy, C₃-C₆alkynyoxy, C₁-C₆haloalkoxy, C₃-C₆haloalkenyloxy, cyano-C₁-C₆alkoxy, C₁-C₆alkoxy-C₁-C₆alkoxy, C₁-C₆alkoxy-C₁-C₆alkoxy-C₁-C₆alkoxy, C₁-C₆alkylthio-C₁-C₆alkoxy, C₁-C₆alkylsulfinyl-C₁-C₆alkoxy, C₁-C₆alkylsulfonyl-C₁-C₆alkoxy, C₁-C₆alkoxycarbonyl-C₁-C₆alkoxy, C₁-C₆alkoxycarbonyl, C₁-C₆alkylcarbonyl, C₁-C₆alkylthio, C₁-C₆alkylsulfinyl, C₁-C₆alkylsulfonyl, C₁-C₆haloalkylthio, C₁-C₆haloalkylsulfinyl, C₁-C₆haloalkylsulfonyl, oxiranyl,

which for its part may be substituted by C₁-C₆alkyl, or by (3-oxetanyl)oxy, which for its part may be substituted by C₁-C₆alkyl, or by benzylthio, benzylsulfinyl, benzylsulfonyl,

C₁-C₆alkylamino, di(C₁-C₆alkyl)amino, R₉S(O)₂O, R₁₀N(R₁₁)SO₂⁻, thiocyanato, phenyl, phenoxy, phenylthio, phenylsulfinyl or phenylsulfonyl;

where the phenyl- or benzyl-containing groups for their part may be substituted by one or more C₁-C₆alkyl, C₁-C₆haloalkyl, C₁-C₆alkoxy, C₁-C₆haloalkoxy, halogen, cyano, hydroxyl or nitro groups, or

R₂ is phenyl which may be mono- or polysubstituted by C₁-C₆alkyl, C₁-C₆haloalkyl, C₁-C₆alkoxy, C₁-C₆haloalkoxy, halogen, cyano, hydroxyl or nitro; or

R₂ is C₃-C₆cycloalkyl, C₁-C₆alkoxyl- or C₁-C₆alkyl-substituted C₃-C₆cycloalkyl, 3-oxetanyl or C₁-C₆alkyl-substituted 3-oxetanyl;

or, if Q is Q₂ or Q₃, or is Q₁ in which R₁₄ and R₂₂ are a C₂-C₃alkylene chain, R₂ is additionally also a five- to ten-membered monocyclic or fused bicyclic ring system which may be aromatic, saturated or partially saturated and may contain 1 to 4 heteroatoms selected from the group consisting of nitrogen, oxygen and sulfur, where the ring system is attached directly or via a C₁-C₄alkylene, C₂-C₄alkenyl-C₁-C₄alkylene, C₂-C₄alkynyl-C₁-C₄alkylene, -N(R₁₂)-C₁-C₄alkylene, -SO-C₁-C₄alkylene or -SO₂-C₁-C₄alkylene group to the substituent X₁ and where each ring system may not contain more than two oxygen atoms and not more than two sulfur atoms and the ring system for its part may be mono-, di- or trisubstituted by C₁-C₆alkyl, C₁-C₆haloalkyl, C₂-C₆alkenyl, C₂-C₆haloalkenyl, C₂-C₆alkynyl, C₂-C₆haloalkynyl, C₁-C₆alkoxy, hydroxyl, C₁-C₆haloalkoxy, C₃-C₆alkenyloxy, C₃-C₆alkynyloxy, mercapto, C₁-C₆alkylthio, C₁-C₆haloalkylthio, C₃-C₆alkenylthio, C₃-C₆haloalkenylthio, C₃-C₆alkynylthio, C₂-C₅alkoxyalkylthio, C₃-C₅acetylalkylthio, C₃-C₆alkoxycarbonylalkylthio, C₂-C₄cyanoalkylthio, C₁-C₆alkylsulfinyl, C₁-C₆haloalkylsulfinyl, C₁-C₆alkylsulfonyl, C₁-C₆haloalkylsulfonyl, aminosulfonyl, C₁-C₂alkylaminosulfonyl, di(C₁-C₂alkyl)aminosulfonyl, di(C₁-C₄alkyl)amino, halogen, cyano, nitro, phenyl and benzylthio, where phenyl and benzylthio for their part may be substituted on the phenyl ring by C₁-C₃alkyl, C₁-C₃haloalkyl, C₁-C₃alkoxy, C₁-C₃haloalkoxy, halogen, cyano or nitro, and where the substituents on the nitrogen in the heterocyclic ring are different from halogen; or

R₂ is hydrogen or unsubstituted C₁-C₆alkyl if

- R₁ is substituted by the group R₅, or
- Q is the group Q₂, or
- Q is the group Q₃ in which X₁ is -O(CO)-, -(CO)O-, -N(R₆)-O-, -O-NR₅₁-, -SO₂NR₇-, -NR₅₂SO₂- or -NR₈-; or
- Q is the group Q₁ in which X₁ is -N(R₆)-O-, -O-NR₅₁-, -SO₂NR₇-, -NR₅₂SO₂- or -NR₈-; or
- Q is the group Q₁ in which R₁₄ and R₂₂ in Q₁ are a C₂-C₃alkylene chain and X₁ is -O(CO)- or -(CO)O-,

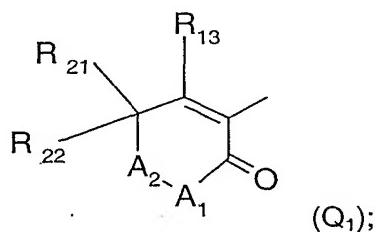
R₃ is C₁-C₃haloalkyl;

R₄ is hydrogen, halogen, C₁-C₃alkyl, C₁-C₃haloalkyl, C₁-C₃alkoxy, C₁-C₃alkoxy-C₁-C₃alkyl or C₁-C₃alkoxy-C₁-C₃alkoxy;

R₅ is hydroxyl, C₁-C₆alkoxy, C₃-C₆cycloalkyloxy, C₁-C₆alkoxy-C₁-C₆alkoxy, C₁-C₆alkoxy-C₁-C₆alkoxy-C₁-C₆alkoxy or C₁-C₂alkylsulfonyloxy;

R₆, R₇, R₈, R₉, R₁₀, R₁₁, R₁₂, R₅₁ and R₅₂ independently of one another are hydrogen, C₁-C₆alkyl, C₁-C₆haloalkyl, C₁-C₆alkoxycarbonyl, C₁-C₆alkylcarbonyl, C₁-C₆alkoxy-C₁-C₆alkyl, C₁-C₆alkoxy-C₁-C₆alkyl substituted by C₁-C₆alkoxy, benzyl or phenyl, where phenyl and benzyl for their part may be mono- or polysubstituted by C₁-C₆alkyl, C₁-C₆haloalkyl, C₁-C₆alkoxy, C₁-C₆haloalkoxy, halogen, cyano, hydroxyl or nitro; where R₆ and R₉ are not simultaneously hydrogen and hydrogen, C₁-C₆alkoxycarbonyl or C₁-C₆alkylcarbonyl, respectively;

Q is Q₁



in which

A₁ is C(R₁₄R₁₅), NR₁₆ or oxygen;

A₂ is C(R₁₇R₁₈), C(O), -C=N-O-R₁₉, oxygen, thio, sulfinyl, sulfonyl, -NR₂₀ or ethylene; with the provisos that A₁ is different from oxygen if A₂ is oxygen, C(O), thio, sulfinyl, -C=N-O-R₁₉, NR₂₀ or C(R₁₇R₁₈), where R₁₇ and R₁₈ independently of one another are C₁-C₄alkoxy, C₁-C₄alkylthio, C₁-C₄alkylsulfinyl, C₁-C₄alkylsulfonyl; and A₁ is different from NR₁₆ if A₂ is thio, sulfinyl or C(R₁₇R₁₈), where R₁₇ and R₁₈ independently of one another are C₁-C₄alkoxy, C₁-C₄alkylthio, C₁-C₄alkylsulfinyl, C₁-C₄alkylsulfonyl; R₁₄ and R₂₂ independently of one another are hydrogen, C₁-C₄alkyl, C₁-C₄haloalkyl, C₃-C₄alkenyl, C₃-C₄alkynyl, C₁-C₄alkylthio, C₁-C₄alkylsulfinyl, C₁-C₄alkylsulfonyl, C₁-C₄alkylsulfonyloxy, C₁-C₄alkoxy, C₁-C₄alkoxycarbonyl or C₁-C₄alkylcarbonyl;

R₁₅ and R₂₁ independently of one another are hydrogen, C₁-C₄alkyl, C₁-C₄haloalkyl, C₃-C₄alkenyl or C₃-C₄alkynyl;

R₁₇ is hydrogen, C₁-C₄alkyl, C₁-C₄haloalkyl, C₁-C₄alkoxy, C₁-C₄alkylthio, C₁-C₄alkylsulfinyl or C₁-C₄alkylsulfonyl;

R₁₈ is hydrogen, C₁-C₄alkyl, C₁-C₄haloalkyl, C₃-C₄alkenyl, C₃-C₄alkynyl, C₁-C₄alkoxy, C₁-C₄alkylthio, C₁-C₄alkylsulfinyl, C₁-C₄alkylsulfonyl or C₁-C₄dialkoxyalkyl-C₁-C₄alkyl;

R₂₀ is C₁-C₄alkyl, C₃-C₆cycloalkyl, C₃-C₄alkenyl, C₃-C₄alkynyl, C₁-C₄alkylcarbonyl, C₁-C₄alkylcarbonyloxy, di(C₁-C₄alkyl)aminocarbonyl or benzyl, where the phenyl group may be mono- or polysubstituted by C₁-C₆alkyl, C₁-C₆haloalkyl, C₁-C₆alkoxy, C₁-C₆haloalkoxy, halogen, cyano, hydroxyl or nitro;

R₁₉ and R₁₆ independently of one another are hydrogen, C₁-C₄alkyl, C₃-C₆cycloalkyl, C₃-C₄alkenyl, C₃-C₄alkynyl, benzyl or phenyl, where phenyl and benzyl for their part may be mono- or polysubstituted by C₁-C₆alkyl, C₁-C₆haloalkyl, C₁-C₆alkoxy, C₁-C₆haloalkoxy, halogen, cyano, hydroxyl or nitro;

or R₁₄ and R₂₂ together form a C₂-C₃alkylene chain;

or R₁₄ and R₁₅ together and/or R₁₇ and R₁₈ together and/or R₂₁ and R₂₂ together form a C₂-C₄alkylene chain which may be interrupted by oxygen and/or carbonyl and/or sulfur, with the proviso that the oxygen and sulfur atoms are separated by at least one methylene group;

or R₁₄ and R₁₈ together form a C₂-C₄alkylene chain; or

R₂₂ and R₁₈ together form a C₂-C₄alkylene chain;

or R₁₈ together with R₂₂ or R₁₄ forms a direct bond;

or R₁₆ and R₁₈ together form a C₂-C₄alkylene chain;

R₁₃ is hydroxyl, O⁻M⁺, where M⁺ is an alkali metal cation or ammonium cation, halogen,

C₁-C₁₂alkylsulfonyloxy, amino, C₁-C₄alkylthio, C₁-C₁₂alkylsulfinyl, C₁-C₁₂alkylsulfonyl,

C₁-C₁₂haloalkylthio, C₁-C₁₂haloalkylsulfinyl, C₁-C₁₂haloalkylsulfonyl,

C₁-C₆alkoxy-C₁-C₆alkylthio, C₁-C₆alkoxy-C₁-C₆alkylsulfinyl, C₁-C₆alkoxy-C₁-C₆alkylsulfonyl,

C₃-C₁₂alkenylthio, C₃-C₁₂alkenylsulfinyl, C₃-C₁₂alkenylsulfonyl, C₃-C₁₂alkynylthio,

C₃-C₁₂alkynylsulfinyl, C₃-C₁₂alkynylsulfonyl, C₁-C₄alkoxycarbonyl-C₁-C₆alkylthio,

C₁-C₄alkoxycarbonyl-C₁-C₄alkylsulfinyl, C₁-C₄alkoxycarbonyl-C₁-C₄alkylsulfonyl,

(C₁-C₄alkoxy)₂P(O)O, C₁-C₄alkyl-(C₁-C₄alkoxy)P(O)O, H(C₁-C₄alkoxy)P(O)O,

R₂₃R₂₄NR₂₅R₂₆N, NH, R₂₇R₂₈NC(O)O-, R₂₉R₃₀NC(O)NH-, C₁-C₁₈alkylcarbonyloxy,

C₂-C₁₈alkenylcarbonyloxy, C₂-C₁₈alkynylcarbonyloxy, C₃-C₆cycloalkylcarbonyloxy,

C₁-C₁₂alkoxycarbonyloxy, C₁-C₁₂alkylthiocarbonyloxy, C₁-C₁₂alkylthiocarbamoyl, where the

alkyl, alkenyl and alkynyl groups may be substituted by halogen, C₁-C₆alkoxy, C₁-C₆alkylthio,

C₁-C₆alkylsulfinyl, C₁-C₆alkylsulfonyl or cyano;

or R₁₃ is phenoxy, phenylthio, phenylsulfinyl, phenylsulfonyl, phenylsulfonylamino, phenylsulfonyloxy or benzoxyloxy, where the phenyl groups for their part may be substituted by one or more halogen, nitro, cyano, C₁-C₄alkyl, C₁-C₄haloalkyl, C₁-C₄alkoxy or C₁-C₄haloalkoxy groups;

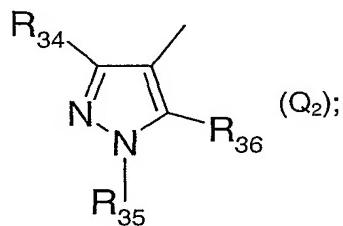
or R₁₃ is a group Het₁-thio, Het₂-sulfinyl, Het₃-sulfonyl, Het₄-(CO)O or Het₅-N(R₃₃); in which

Het₁, Het₂, Het₃, Het₄ and Het₅ independently of one another are a five- to ten-membered monocyclic or fused bicyclic ring system which may be aromatic or partially saturated and may contain 1 to 4 heteroatoms selected from the group consisting of nitrogen, oxygen and sulfur, and where each ring system may not contain more than 2 oxygen atoms and not more than 2 sulfur atoms, and where the ring system itself can be substituted by C₁-C₆alkyl, C₁-C₆haloalkyl, C₁-C₆alkoxy, C₁-C₆haloalkoxy, C₁-C₆alkylthio, C₁-C₆alkylsulfinyl, C₁-C₆alkylsulfonyl, di(C₁-C₄alkyl)aminosulfonyl, di(C₁-C₄alkyl)amino, halogen, cyano, nitro or phenyl, and where the substituents on the nitrogen in the heterocyclic ring are different from halogen;

R₂₃, R₂₄, R₂₅, R₂₆, R₂₇, R₂₈, R₂₉, R₃₀ and R₃₃ independently of one another are hydrogen or C₁-C₆alkyl;

or R₂₃ and R₂₄ together or R₂₅ and R₂₆ together or R₂₇ and R₂₈ together or R₂₉ and R₃₀ together are pyrrolidino, piperidino, morpholino, thiomorpholino, which may be mono- or polysubstituted by methyl groups;

or Q is Q₂



in which

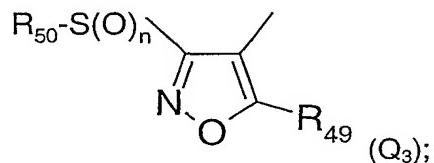
R₃₄ is hydrogen, C₁-C₄alkyl, C₁-C₄haloalkyl, C₃-C₆cycloalkyl, C₂-C₄alkenyl, C₂-C₄alkynyl or benzyl, where the phenyl group may be mono- or polysubstituted by C₁-C₆alkyl, C₁-C₆haloalkyl, C₁-C₆alkoxy, C₁-C₆haloalkoxy, halogen, cyano, hydroxyl or nitro;

R₃₅ is hydrogen, C₁-C₄alkyl, C₁-C₄haloalkyl, C₃-C₆cycloalkyl, C₃-C₄alkenyl, C₃-C₄alkynyl or benzyl, where the phenyl group may be mono- or polysubstituted by C₁-C₆alkyl, C₁-C₆haloalkyl, C₁-C₆alkoxy, C₁-C₆haloalkoxy, halogen, cyano, hydroxyl or nitro;

R₃₆ is hydroxyl, O⁻M⁺, where M⁺ is an alkali metal cation or ammonium cation, halogen, C₁-C₁₂alkylsulfonyloxy, amino, C₁-C₄alkylthio, C₁-C₁₂alkylsulfinyl, C₁-C₁₂alkylsulfonyl, C₁-C₁₂haloalkylthio, C₁-C₁₂haloalkylsulfinyl, C₁-C₁₂haloalkylsulfonyl, C₁-C₆alkoxy-C₁-C₆alkylthio, C₁-C₆alkoxy-C₁-C₆alkylsulfinyl, C₁-C₆alkoxy-C₁-C₆alkylsulfonyl, C₃-C₁₂alkenylthio, C₃-C₁₂alkenylsulfinyl, C₃-C₁₂alkenylsulfonyl, C₃-C₁₂alkynylthio, C₃-C₁₂alkynylsulfinyl, C₃-C₁₂alkynylsulfonyl, C₁-C₄alkoxycarbonyl-C₁-C₄alkylthio, C₁-C₄alkoxycarbonyl-C₁-C₄alkylsulfinyl, C₁-C₄alkoxycarbonyl-C₁-C₄alkylsulfonyl,

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$(C_1\text{-}C_4\text{alkoxy})_2P(O)O$, $C_1\text{-}C_4\text{alkyl}\text{-}(C_1\text{-}C_4\text{alkoxy})P(O)O$, $H(C_1\text{-}C_4\text{alkoxy})P(O)O$, $R_{37}R_{38}N$, $R_{39}R_{40}NNH$, $R_{41}R_{42}NC(O)O^-$, $R_{43}R_{44}NC(O)NH^-$, $C_1\text{-}C_{18}\text{alkylcarbonyloxy}$, $C_2\text{-}C_{18}\text{alkenylcarbonyloxy}$, $C_2\text{-}C_{18}\text{alkynylcarbonyloxy}$, $C_3\text{-}C_6\text{cycloalkylcarbonyloxy}$, $C_1\text{-}C_{12}\text{alkoxycarbonyloxy}$, $C_1\text{-}C_{12}\text{alkylthiocarbonyloxy}$ or $C_1\text{-}C_{12}\text{alkylthiocarbamoyl}$, where the alkyl, alkenyl and alkynyl groups may be substituted by halogen, $C_1\text{-}C_6\text{alkoxy}$, $C_1\text{-}C_6\text{alkylthio}$, $C_1\text{-}C_6\text{alkylsulfinyl}$, $C_1\text{-}C_6\text{alkylsulfonyl}$ or cyano; or R_{36} is phenoxy, phenylthio, phenylsulfinyl, phenylsulfonyl, phenylsulfonylamino, phenylsulfonyloxy or benzoyloxy, where the phenyl groups for their part may be mono- or polysubstituted by halogen, nitro, cyano, $C_1\text{-}C_4\text{alkyl}$, $C_1\text{-}C_4\text{haloalkyl}$, $C_1\text{-}C_4\text{alkoxy}$, $C_1\text{-}C_4\text{haloalkoxy}$, or R_{36} is a group $\text{Het}_7\text{-thio}$, $\text{Het}_8\text{-sulfinyl}$, $\text{Het}_9\text{-sulfonyl}$, $\text{Het}_{10}\text{-}(CO)O$ or $\text{Het}_{11}\text{-}N(R_{47})$; in which Het_7 , Het_8 , Het_9 , Het_{10} and Het_{11} independently of one another are a five- to ten-membered monocyclic or fused bicyclic ring system which may be aromatic or partially saturated and may contain 1 to 4 heteroatoms selected from the group consisting of nitrogen, oxygen and sulfur, and where each ring system may not contain more than 2 oxygen atoms and not more than 2 sulfur atoms, and where the ring system for its part may be substituted by $C_1\text{-}C_6\text{alkyl}$, $C_1\text{-}C_6\text{haloalkyl}$, $C_1\text{-}C_6\text{alkoxy}$, $C_1\text{-}C_6\text{haloalkoxy}$, $C_1\text{-}C_6\text{alkylthio}$, $C_1\text{-}C_6\text{alkylsulfinyl}$, $C_1\text{-}C_6\text{alkylsulfonyl}$, $\text{di}(C_1\text{-}C_4\text{alkyl})\text{aminosulfonyl}$, $\text{di}(C_1\text{-}C_4\text{alkyl})\text{amino}$, halogen, cyano, nitro or phenyl, and where the substituents on the nitrogen in the heterocyclic ring are different from halogen; R_{37} , R_{38} , R_{39} , R_{40} , R_{41} , R_{42} , R_{43} , R_{44} and R_{47} independently of one another are hydrogen or $C_1\text{-}C_6\text{alkyl}$; or R_{37} and R_{38} together or R_{39} and R_{40} together or R_{41} and R_{42} together or R_{43} and R_{44} together are pyrrolidino, piperidino, morpholino, thiomorpholino, which may be mono- or polysubstituted by methyl groups; or Q is Q_3

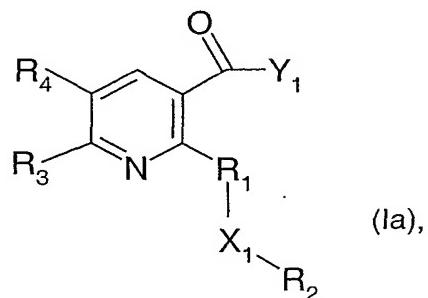


in which

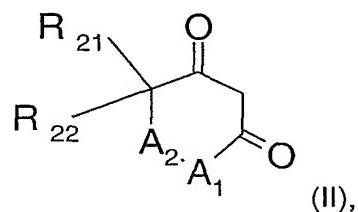
R_{49} is $C_1\text{-}C_4\text{alkyl}$, $C_1\text{-}C_4\text{haloalkyl}$, $C_3\text{-}C_6\text{cycloalkyl}$ or halogen-substituted $C_3\text{-}C_6\text{cycloalkyl}$;

R_{50} is C_1 - C_3 alkylene which may be substituted by halogen, hydroxyl, C_1 - C_6 alkoxy, C_2 - C_6 alkenyl, C_2 - C_6 alkynyl, C_3 - C_6 cycloalkyl, C_1 - C_6 alkoxy- C_1 - C_6 alkoxy, C_1 - C_6 alkoxy- C_1 - C_6 alkoxy- C_1 - C_6 alkoxy, (3-oxetanyl)oxy, or by C_1 - C_6 alkyl-substituted (3-oxetanyl)oxy, or by benzylthio, benzylsulfinyl, benzylsulfonyl, phenyl, phenoxy, phenylthio, phenylsulfinyl or phenylsulfonyl, where the phenyl- and benzyl-containing groups for their part may be substituted by one or more C_1 - C_6 alkyl, C_1 - C_6 haloalkyl, C_1 - C_6 alkoxy, C_1 - C_6 haloalkoxy, halogen, cyano, hydroxyl or nitro groups;
 or R_{50} is phenyl, where the phenyl-containing group for its part may be substituted by one or more C_1 - C_6 alkyl, C_1 - C_6 haloalkyl, C_1 - C_6 alkoxy, C_1 - C_6 haloalkoxy, halogen, cyano, hydroxyl or nitro,
 or R_{50} is C_3 - C_6 cycloalkyl, C_1 - C_6 alkoxy- or C_1 - C_6 alkyl-substituted C_3 - C_6 cycloalkyl, 3-oxetanyl or C_1 - C_6 alkyl-substituted 3-oxetanyl; and
 n is 0, 1 or 2; and agronomically acceptable salts/N-oxides/isomers/enantiomers of this compound.

2. A process for preparing compounds of the formula I as claimed in claim 1, which comprises, to prepare compounds of the formula I, in which R_1 , R_2 , R_3 , R_4 and X_1 are as defined under formula I and Q is a group Q_1 , either a) reacting a compound of the formula Ia

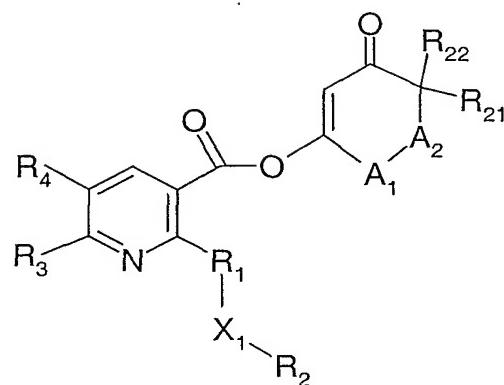
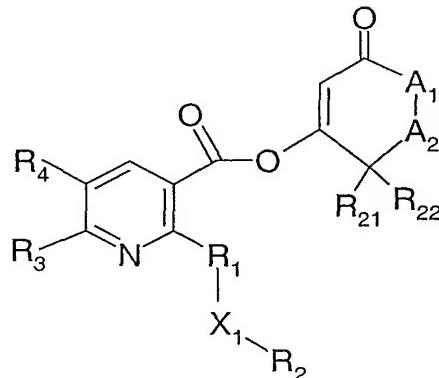


in which R_1 , R_2 , R_3 , R_4 and X_1 are as defined under formula I and Y_1 is a leaving group, in an inert organic solvent in the presence of a base with a compound of the formula II

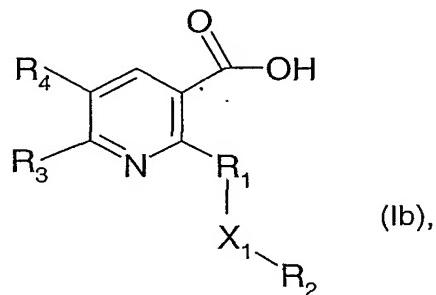


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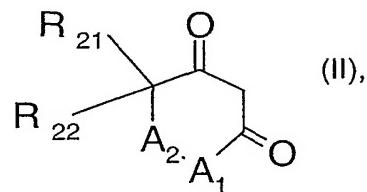
in which R_{22} , R_{21} , A_2 and A_1 are as defined under formula I, to give the compounds of the formulae IIIa and IIIb



and then isomerizing these in the presence of a base and a catalytic amount of dimethylaminopyridine (DMAP) or a source of cyanide, for example acetone cyanohydrin; or b) reacting a compound of the formula Ib



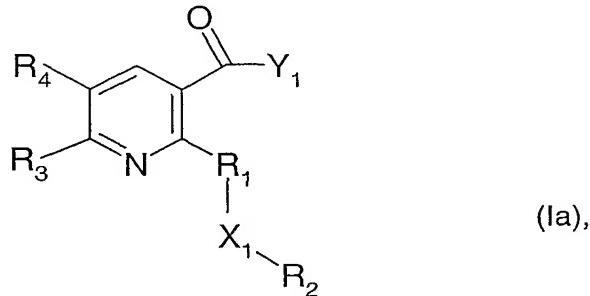
in which R_1 , R_2 , R_3 , R_4 and X_1 are as defined under formula I, with a compound of the formula II



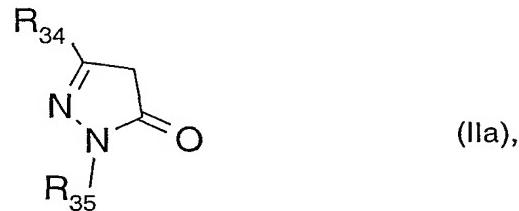
in which R_{22} , R_{21} , A_1 and A_2 are as defined under formula I, in an inert organic solvent in the presence of a base and a coupling agent to give the compound of the formula IIIa or IIIb,

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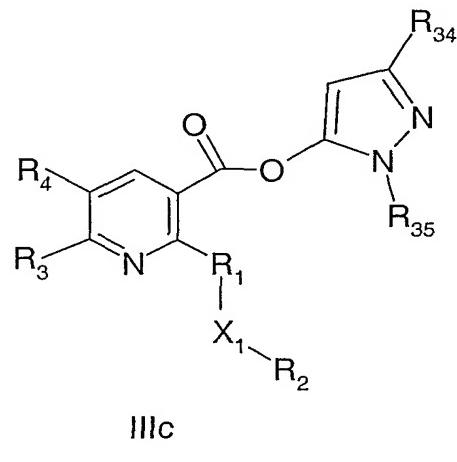
and then isomerizing these as described under route a); or, to prepare the compounds of the formula I, in which Q is a group Q₂, either a) reacting a compound of the formula Ia



in which R₁, R₂, R₃, R₄ and X₁ are as defined under formula I and Y₁ is a leaving group, with a compound of the formula IIa



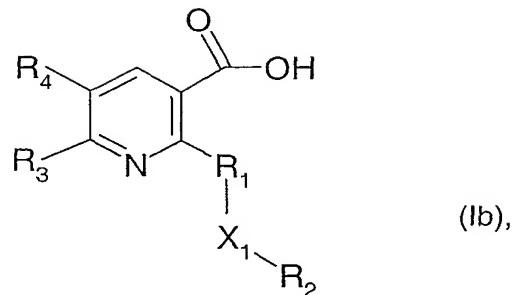
in which R₃₄ and R₃₅ are as defined under formula I, in an inert organic solvent in the presence of a base to give the compound of the formula IIIc



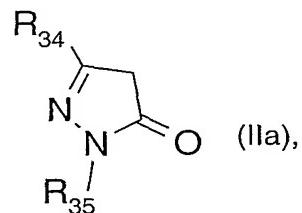
in which R₁, R₂, R₃, R₄, R₃₄, R₃₅ and X₁ are as defined under formula I, and then isomerizing this compound in the presence of a base and a catalytic amount of a source of cyanide; or

b) reacting a compound of the formula Ib

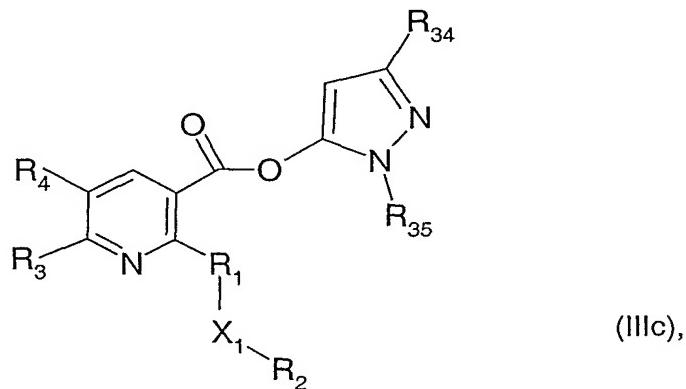
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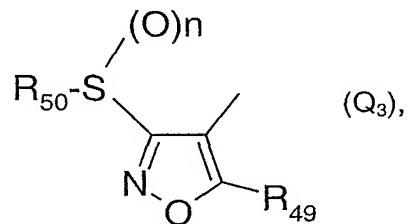
in which R₁, R₂, R₃, R₄ and X₁ are as defined under formula I, with a compound of the formula IIa



in which R₃₄ and R₃₅ are as defined above, in an inert organic solvent in the presence of a base and a coupling agent to give the compound of the formula IIIc

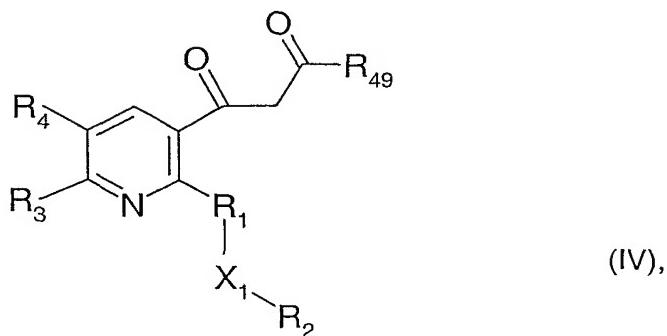


and then isomerizing this compound as described under route a); or, to prepare compounds of the formula I, in which Q is a group



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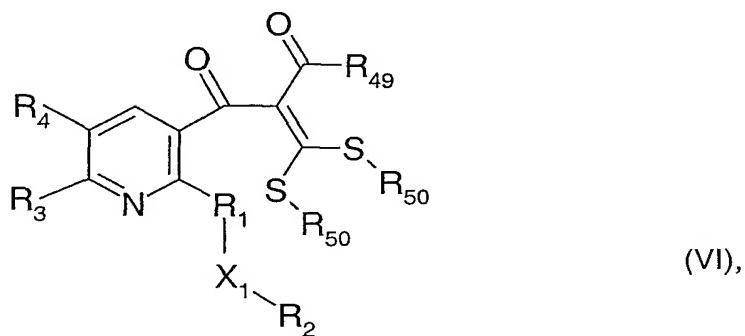
in which n is 0 and R_{50} and R_{49} are as defined above, either a) converting a compound of the formula IV



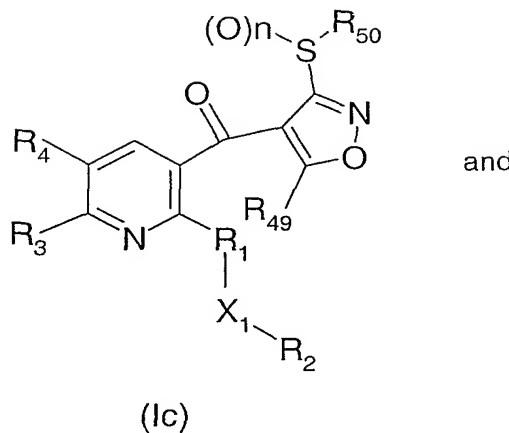
in which X_1 , R_1 , R_2 , R_3 , R_4 and R_{49} are as defined above, in the presence of a base, carbon disulfide and an alkylating agent of the formula V



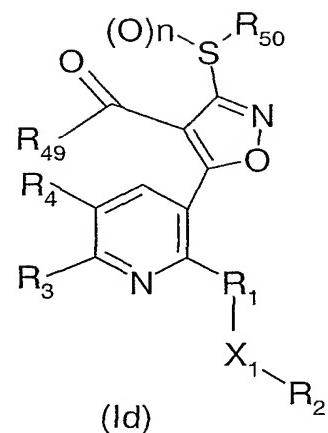
in which R_{50} is as defined under formula I, and Y_2 is a leaving group, into the compound of the formula VI



in which R₁, R₂, R₃, R₄, R₅₀, X₁ and R₄₉ are as defined under formula I, and then cyclizing this compound with hydroxylamine hydrochloride in the presence of a base to give the isomeric compounds of the formulae Ic and Id



and



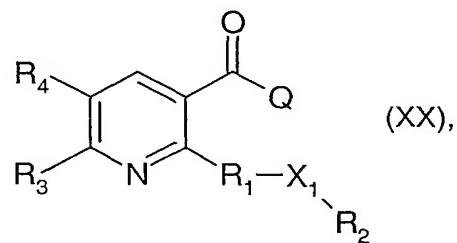
and then oxidizing these compounds with an oxidizing agent, for example with peracids, to give the corresponding sulfoxides ($n = 1$) and sulfones ($n = 2$) of the formulae Ie and If, respectively.

3. A herbicidal and plant-growth-inhibiting composition, which contains a herbicidally effective amount of a compound of the formula I on an inert carrier.

4. A method for controlling undesirable plant growth, wherein a herbicidally effective amount of an active compound of the formula I or a composition which contains this active compound is applied to the plants or their habitat.

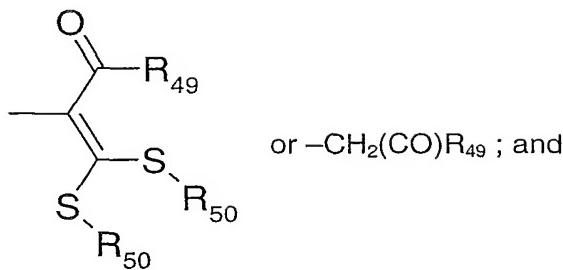
5. A method for inhibiting plant growth, wherein a herbicidally effective amount of an active compound of the formula I or a composition which contains this active compound is applied to the plants or their habitat.

6. A compound of the formula XX



in which

Q is hydroxyl, halogen, cyano or C₁-C₆alkoxy, or is a group of the formula



$\text{R}_1, \text{R}_3, \text{R}_4, \text{R}_{49}, \text{R}_{50}, \text{X}_1$ and p are as defined under formula I and R_2 is a $\text{C}_1\text{-}\text{C}_8$ alkyl, $\text{C}_3\text{-}\text{C}_6$ alkenyl or $\text{C}_3\text{-}\text{C}_6$ alkynyl group which is mono- or polysubstituted by halogen, hydroxyl, amino, formyl, nitro, cyano, mercapto, carbamoyl, $\text{C}_1\text{-}\text{C}_6$ alkoxy, $\text{C}_1\text{-}\text{C}_6$ alkoxycarbonyl, $\text{C}_2\text{-}\text{C}_6$ alkenyl, $\text{C}_2\text{-}\text{C}_6$ haloalkenyl, $\text{C}_2\text{-}\text{C}_6$ alkynyl, $\text{C}_2\text{-}\text{C}_6$ haloalkynyl, $\text{C}_3\text{-}\text{C}_6$ cycloalkyl, by halogen-substituted $\text{C}_3\text{-}\text{C}_6$ cycloalkyl, or by $\text{C}_3\text{-}\text{C}_6$ alkenyloxy, $\text{C}_3\text{-}\text{C}_6$ alkynyloxy, $\text{C}_1\text{-}\text{C}_6$ haloalkoxy, $\text{C}_3\text{-}\text{C}_6$ haloalkenyloxy, cyano- $\text{C}_1\text{-}\text{C}_6$ alkoxy, $\text{C}_1\text{-}\text{C}_6$ alkoxy- $\text{C}_1\text{-}\text{C}_6$ alkoxy, $\text{C}_1\text{-}\text{C}_6$ alkylthio- $\text{C}_1\text{-}\text{C}_6$ alkoxy, $\text{C}_1\text{-}\text{C}_6$ alkylsulfinyl- $\text{C}_1\text{-}\text{C}_6$ alkoxy, $\text{C}_1\text{-}\text{C}_6$ alkylsulfonyl- $\text{C}_1\text{-}\text{C}_6$ alkoxy, $\text{C}_1\text{-}\text{C}_6$ alkoxycarbonyl- $\text{C}_1\text{-}\text{C}_6$ alkoxy, $\text{C}_1\text{-}\text{C}_6$ alkoxycarbonyl, $\text{C}_1\text{-}\text{C}_6$ alkylcarbonyl, $\text{C}_1\text{-}\text{C}_6$ alkylthio, $\text{C}_1\text{-}\text{C}_6$ alkylsulfinyl, $\text{C}_1\text{-}\text{C}_6$ alkylsulfonyl, $\text{C}_1\text{-}\text{C}_6$ haloalkylthio, $\text{C}_1\text{-}\text{C}_6$ haloalkylsulfinyl, $\text{C}_1\text{-}\text{C}_6$ haloalkylsulfonyl, oxiranyl, which for its part may be substituted by $\text{C}_1\text{-}\text{C}_6$ alkyl, or by (3-oxetanyl)oxy, which for its part may be substituted by $\text{C}_1\text{-}\text{C}_6$ alkyl, or by benzylthio, benzylsulfinyl, benzylsulfonyl, $\text{C}_1\text{-}\text{C}_6$ alkylamino, di($\text{C}_1\text{-}\text{C}_6$ alkyl)amino, $\text{R}_9\text{S}(\text{O})_2\text{O}$, $\text{R}_{10}\text{N}(\text{R}_{11})\text{SO}_2^-$, thiocyanato, phenyl, phenoxy, phenylthio, phenylsulfinyl or phenylsulfonyl; where the phenyl- or benzyl-containing groups for their part may be substituted by one or more $\text{C}_1\text{-}\text{C}_6$ alkyl, $\text{C}_1\text{-}\text{C}_6$ haloalkyl, $\text{C}_1\text{-}\text{C}_6$ alkoxy, $\text{C}_1\text{-}\text{C}_6$ haloalkoxy, halogen, cyano, hydroxyl or nitro groups, or

R_2 is phenyl which may be mono- or polysubstituted by $\text{C}_1\text{-}\text{C}_6$ alkyl, $\text{C}_1\text{-}\text{C}_6$ haloalkyl, $\text{C}_1\text{-}\text{C}_6$ alkoxy, $\text{C}_1\text{-}\text{C}_6$ haloalkoxy, halogen, cyano, hydroxyl or nitro; or

R_2 is $\text{C}_3\text{-}\text{C}_6$ cycloalkyl, $\text{C}_1\text{-}\text{C}_6$ alkoxy- or $\text{C}_1\text{-}\text{C}_6$ alkyl-substituted $\text{C}_3\text{-}\text{C}_6$ cycloalkyl, 3-oxetanyl or $\text{C}_1\text{-}\text{C}_6$ alkyl-substituted 3-oxetanyl;

or

if X_1 is $-\text{N}(\text{R}_6)\text{-O}-$, $-\text{O-NR}_{51}$, SO_2NR_7^- or $-\text{NR}_{52}\text{SO}_2^-$ and $\text{R}_6, \text{R}_7, \text{R}_{51}$ and R_{52} are as defined under formula I,

R_2 may additionally be hydrogen, unsubstituted $\text{C}_1\text{-}\text{C}_6$ alkyl, or

a five- to ten-membered monocyclic or fused bicyclic ring system which may be aromatic, saturated or partially saturated and may contain 1 to 4 heteroatoms selected from the group consisting of nitrogen, oxygen and sulfur, where the ring system is attached directly or via a

C₁-C₄alkylene, C₂-C₄alkenyl-C₁-C₄alkylene, C₂-C₄alkynyl-C₁-C₄alkylene,
-N(R₁₂)-C₁-C₄alkylene, -SO-C₁-C₄alkylene or -SO₂-C₁-C₄alkylene group to the substituent X₁,
and where each ring system may not contain more than 2 oxygen atoms and not more than
two sulfur atoms, and where the ring system for its part may be mono-, di- or trisubstituted
by C₁-C₆alkyl, C₁-C₆haloalkyl, C₂-C₆alkenyl, C₂-C₆haloalkenyl, C₂-C₆alkynyl,
C₂-C₆haloalkynyl, C₁-C₆alkoxy, hydroxyl, C₁-C₆haloalkoxy, C₃-C₆alkenyloxy, C₃-C₆alkynyoxy,
mercapto, C₁-C₆alkylthio, C₁-C₆-haloalkylthio, C₃-C₆alkenylthio, C₃-C₆haloalkenylthio,
C₃-C₆alkynylthio, C₂-C₅alkoxyalkylthio, C₃-C₅acetylalkylthio, C₃-C₆alkoxycarbonylalkylthio,
C₂-C₄cyanoalkylthio, C₁-C₆alkylsulfinyl, C₁-C₆haloalkylsulfinyl, C₁-C₆alkylsulfonyl,
C₁-C₆haloalkylsulfonyl, aminosulfonyl, C₁-C₂alkylaminosulfonyl, di(C₁-C₂alkyl)aminosulfonyl,
di(C₁-C₄alkyl)amino, halogen, cyano, nitro, phenyl and benzylthio, where phenyl and
benzylthio for their part may be substituted on the phenyl ring by C₁-C₃alkyl, C₁-C₃haloalkyl,
C₁-C₃alkoxy, C₁-C₃haloalkoxy, halogen, cyano or nitro, and where the substituents on the
nitrogen in the heterocyclic ring are different from halogen.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP 01/06430

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 C07D401/06 C07D405/06 C07D409/06 C07D413/06 C07D417/06
C07D213/50 A01N43/40

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C07D A01N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

CHEM ABS Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

° Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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- "&" document member of the same patent family

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| Date of the actual completion of the international search | Date of mailing of the international search report |
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